CHEMICAL INDUSTRIES

. . the business magazine for makers and users of chemicals

Management • Research • Production • Marketing

Volume 45 Number 7

Contents for December, 1939

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Consulting Editors

R. T. Baldwin, L. W. Bass, F. M. Becket, B. T. Brooks, J. V. N. Dorr, C. R. Downs, W. M. Grosvenor, W. S. Landis, and M. C. Whitaker.

Publication Staff

Williams Haynes, Editorial Director; Walter J. Murphy, Managing Editor; W. F. George, Advertising Manager; L. Chas. Todaro, Circulation Manager; John H. Burt, Production Manager.

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10,000 gallons, please!

It's Claiborne Duhon's job to fill the great cavity inside that tank car with Mathieson Liquid Caustic Soda. More than that—he sees to it that the car is ready to receive its cargo. Checks it from stem to stern—makes sure the interior is clean and free from defects, that valves and other equipment are all in working order.

This car is one of a large fleet carrying liquid caustic from modern Mathieson plants to consumers throughout the country's principal industrial areas. All three Mathieson producing points—Lake Charles, La., Saltville, Va. and Niagara Falls—supply both 50% and 70% liquid caustic in tank cars; also 76% solid and 76% flake caustic in drums.

Liquid caustic from all three Mathieson plants has long been noted for its purity and uniformity. And Mathieson's up-to-date tank car equipment, lined and insulated, is a vital factor in preserving the high purity of the product until delivered safely into the hands of Mathieson customers.

Mathieson Chemicals

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60 E. 42ND STREET, NEW YORK, N. Y.

SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . HTH PRODUCTS . . . AMMONIA, ANHYDROUS and AQUA . . . FUSED ALKALI PRODUCTS . . . CCH (INDUSTRIAL HYPOCHLORITE) . . . DRY ICE . . . CARBONIC GAS . . . ANALYTICAL SODIUM CHLORITE

The Reader Writes:—

The New Census

Completed after extended consultation with leaders in the chemical industry, the new schedules prepared by the U. S. Census Bureau for the comprehensive chemical survey to be taken under the Sixteenth Decennial Census in 1940 are much simpler, and in many cases, shorter, than the forms used in the 1937 Census.

Also, because of changes in classifications in the industry, more specific interpretations of specific facts for particular branches of the field will be available. The general classification for bulk chemicals and products, for instance, used in 1937, has been broken down to give separate statistics on "Plastic Materials," "Coal Tar Products (crude and intermediate)," and "Chemicals not Elsewhere Classified." The former grouping of "Paints, Pigments, and Varnishes" has been broadened and now, in two classes, it covers "Paints, Varnishes, and Lacquers," and "Colors and Pigments."

Another change for simplicity is in the former "Wood Distillation and Charcoal Manufacture" title, which now is "Hardwood Distillation and Charcoal Manufacturing" and "Wood Naval Stores." "Turpentine and Rosin" have been reclassified into "Gum Naval Stores (processing but not gathering or warehousing)." Oils, previously listed under four classifications, have been increased to six, the original groups having been rearranged to good advantage and separations made for soy beans and for fish oils and products.

For the 1940 Census, there will be 36 chemical classifications altogether: Paints, varnishes, and lacquers; colors and pigments; cottonseed products, oil, cake, meal, and linters; linseed products, oil, cake, and meal; soybean products, oil, cake, and meal; essential oils; fish and other marine oils, cake, and meal; animal and vegetable oils not elsewhere classified; drugs and medicines (including drug grinding); perfumes, cosmetics, and other toilet preparations; insecticides, fungicides, and related industrial and household compounds.

Also included are soap and glycerin; rayon and allied products; hardwood distillation and charcoal manufacture; wood naval stores; gum naval stores (processing but not gathering or warehousing); fertilizers; tanning materials, natural dyestuffs, mordants and assistants, and sizes; coal tar products (crude and intermediate); plastic materials; explosives (including blasting caps and fuzes); salt; compressed and liquefied gases not made in petroleum refineries or in natural gasoline plants.

Additional classifications cover bone black, carbon black, and lamp black; printing ink; ammunition; cleaning and polishing preparations, blackings, and dressings; glue and gelatin; grease and tallow (except lubricating grease); lubricating oils and greases not made in petroleum refineries; fireworks; candles; bluing, mucilage, paste, and other adhesives, except glue and rubber cement; writing ink, and chemicals not elsewhere classified.

Various "sub-changes" have also been made. On the schedules proper, for instance, provision is made for listing sodium silicate according to its various *uses*. Bleaching substances, formerly generalized, are now more specific.

"Drug grinding," previously covered as a separate industry, has been combined with "Drugs and Medicines," since its contribution to the main group during recent years has been, proportionally, so small. In 1937, but 21 drug grinding establishments reported; their products were valued at a little less than $8,000,000, whereas firms manufacturing drugs and medicines, numbering 1,013 in 1937, turned out products to a total of nearly $346,000,000, selling value at the plant.

Since its enumerating procedure differs from that used in 1937, the Census Bureau declares that basic statistics for the chemical industry will be ready for release even before the end of the calendar year, provided, of course, that the manufacturers cooperate as they have always done in the past.

The schedules will be delivered by enumerators personally, who will then stand by to assist in the prompt filling out of the forms. The reports can thus be forwarded immediately to Washington, quickly combined, tabulated, analyzed, and released to the industry.

The chemical census will begin in January. Every establishment in the country will be canvassed. Concurrently will start the business censuses of drug wholesalers and retailers of all classes, and all other distributors of goods or services of whatever kind. Mines and quarries, and all other industries besides chemical, of course, will be surveyed.

Since 1940 is a decennial census year, reporting is mandatory on the part of every firm and individual in the country. However, the same Act of Congress that requires reporting also gives protection. It prohibits the use of Census statements for any purpose other than for broad statistics.

All Census employees are sworn to strict secrecy. Reports cannot be seen or used by any other government or private agency or individual, nor can they be used for taxation, regulation, legal procedures, or anything of the kind.

A. W. VON STRUVE,
Periodicals Service Section,
Division of Public Relations,
Dept. of Commerce, Bureau of the Census,
Washington, D. C.

New '39 Edition Corrects This

We have used your Buyer's Guidebook Number with a great deal of satisfaction for several years, and believe that it fills a very definite need among chemical buyers. In general we believe that the material is very well arranged and easily accessible. However, in one respect we believe that the publication might be improved from the standpoint of the person using the volume.

We refer to the fact that the only Company Index is that arranged geographically by states. It is a time-consuming job to locate the addresses of those companies listed in your specialties section, specifically, non-advertisers.

We realize that from your standpoint your present method of listing gives a considerable advantage to those companies which advertise in your volume and that it might, therefore, be desirable not to make a change. However, from the standpoint of the user we believe that a complete alphabetical index of all companies showing their mailing addresses would be a desirable addition to your book.

P. E. PETERS,
Research Chemist,
North Shore Coke & Chemical Co.,
Waukegan, Ill.

CALENDAR OF EVENTS

17th Exposition of Chemical Industries. Grand Central Palace, N. Y. City, Dec. 4-9.

N. J. Oil Trades Association, annual meeting and banquet, Robert Treat Hotel, Newark, N. J., Dec. 7.

A. C. S., Eighth National Organic Chemistry Symposium, Div. of Organic Chem., St. Louis, Mo., Dec. 28-30.

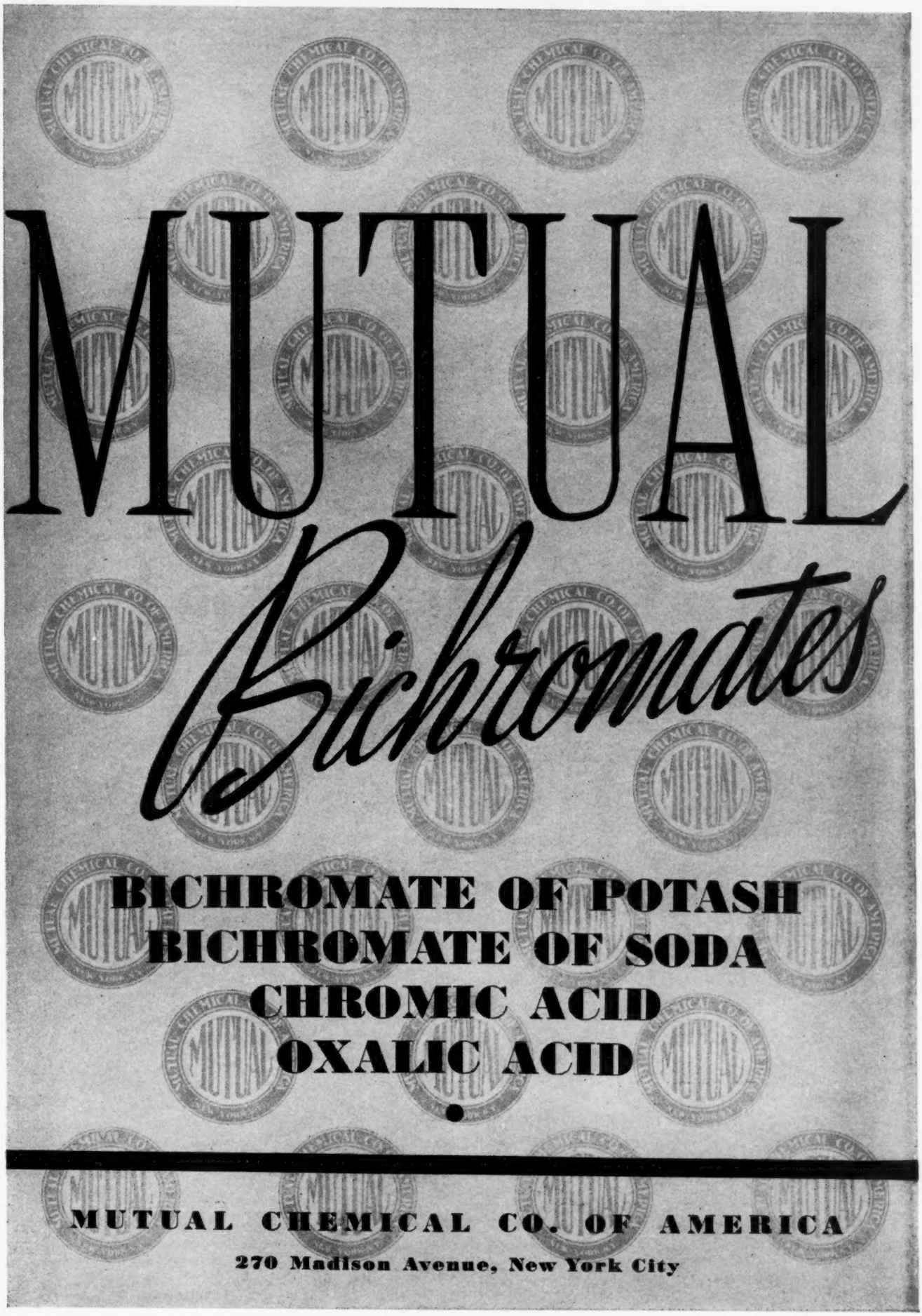
Amer. Inst. of Min. & Met. Eng., N. Y. City, Feb. 12-15. 10th Annual Packaging Show, Hotel Astor, N. Y. City, March 26-29.

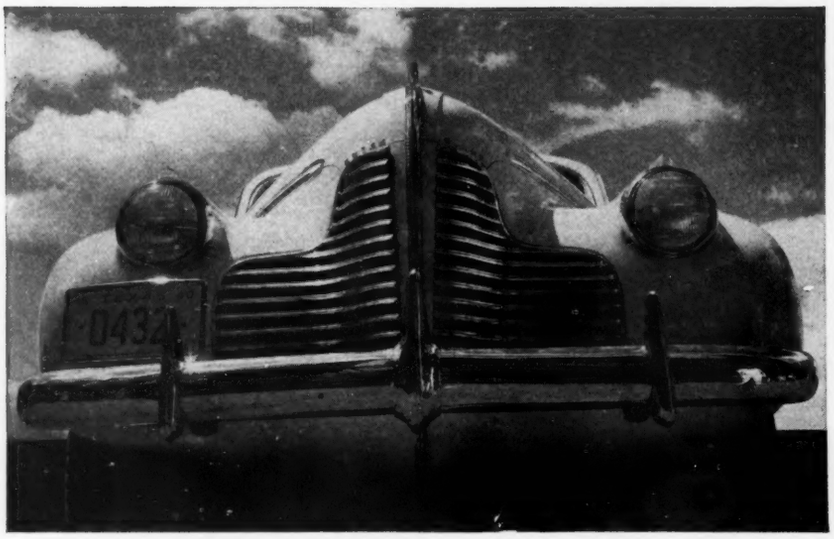
Amer. Ceramic Society, 42nd Annual Meeting, Royal York Hotel, Toronto, Canada, Apr. 7-12.

A. C. S., semi-annual meeting, Cincinnati, O., Apr. 8-12.

Amer. Petroleum Institute, Eastern District, Div. of Production, Columbus, O., Apr. 10-12.

National Petroleum Association, 37th Semi-Annual Meeting, Hotel Cleveland, Cleveland, O., Apr. 18-19.


MUTUAL
Bichromates
BICHROMATE OF POTASH
BICHROMATE OF SODA
CHROMIC ACID
OXALIC ACID
MUTUAL CHEMICAL CO. OF AMERICA
270 Madison Avenue, New York City

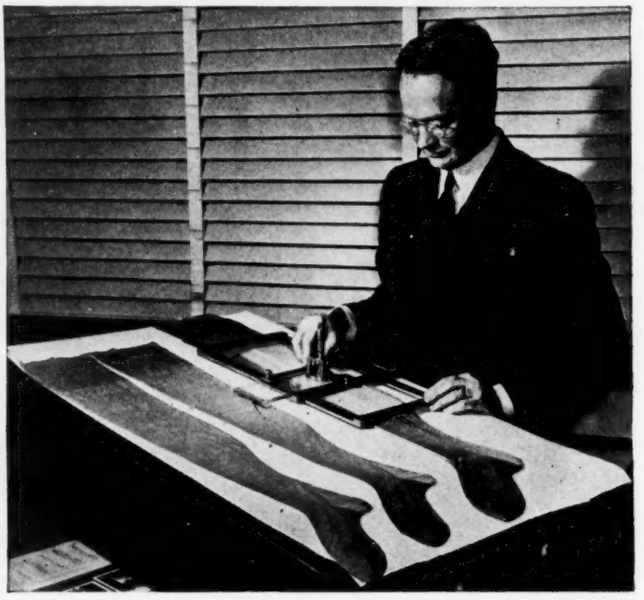


(*Left*) **SHINY NEW LICENSE PLATES** will keep their gloss throughout 1940, thanks to the excellent adhesion and outdoor durability of present-day enamels. For enamels requiring these characteristics, the oxidizing type REZYL** Resins possess outstanding advantages. To insure the durability of license plates and road marking signs, many state specifications require that they must be finished with enamels formulated with REZYL Resins.

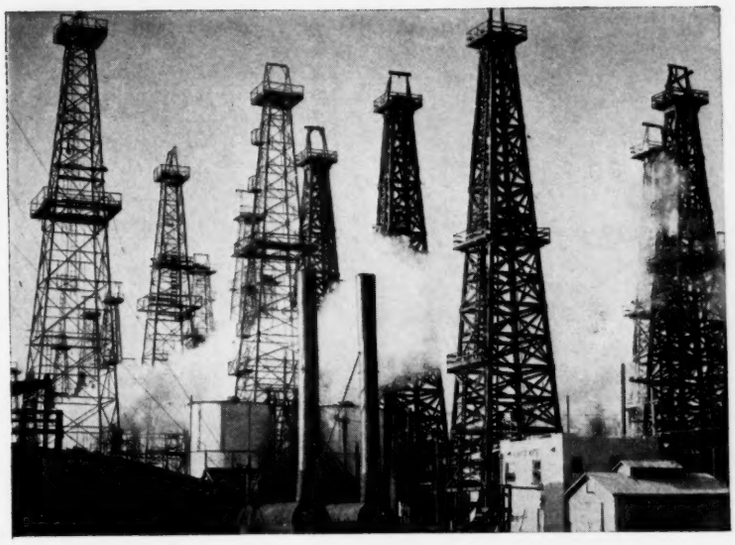
(*Right, opposite*) **SELF-POWERED OIL WELLS** in West Texas are the nearest known approach to perpetual motion. Power comes from "free air"—a mixture of gases containing no oxygen, and comes from a subterranean red sand found in the vicinity. It has a pressure of about 350 pounds gage. Petroleum industry is one of the largest consumers of chemicals—and is No. 1 user of sulphuric acid. Cyanamid is a foremost supplier of many essential chemicals to the petroleum industry.

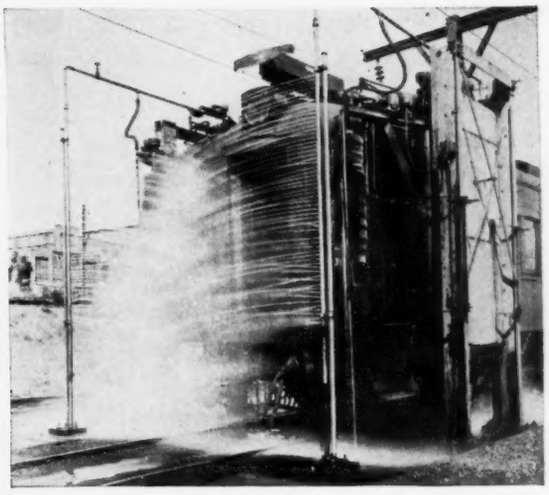
Life on the Chemical

(*Below*) **SNAG RESISTANCE OF HOSIERY** comes under close scrutiny with this device recently perfected at the Bureau of Standards. As standards of hosiery manufacture become constantly more exacting, Cyanamid aids the industry with the development of chemicals that make better hosiery possible. Cyanamid's chemicals for the textile industry include Sulphonated Oils, Softeners, Sizing Compounds, Penetrants, and many other products.



(*Above*) **CHEMICALS FLAMEPROOF THE CHRISTMAS TREE** to reduce the risk of holiday fires. Chemists of the Department of Agriculture have found that freshly-cut trees retain their ability to draw up water. If the end of the tree is immersed in a flameproofing solution, the solution rises like sap. Ammonium sulphate and calcium chloride have been found to be effective flameproofing agents. Solutions of them are readily introduced into the tree in this way. Trees so treated will char but will not flame, even if an open flame accidentally comes in contact with them, according to the report by Government chemists.

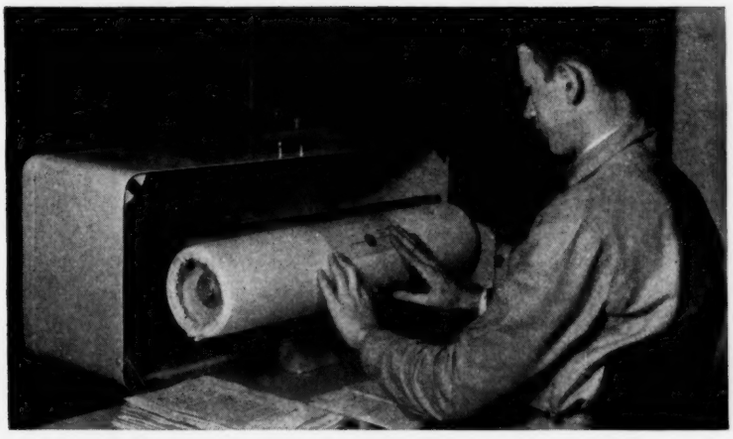




(*Above*) **BATHING A LOCOMOTIVE** is just one of the difficult cleaning problems facing modern industry. Many of these problems have been solved by the soap, detergents and cleaning compounds made possible by new developments in soap-making chemicals. Outstanding among these newer chemicals are Cyanamid's Tetra Sodium Pyro Phosphate and AEROSOL* Wetting Agents.

Newsfront

(*Below*) **PHOTOGRAPHING THE ELECTRON** is the unusual task of this new super-microscope that records streams of electrons as the ordinary camera registers light rays. It is used at Case School of Applied Science in analyzing atomic structures, in the search for new ways of reducing the damages resulting from wear, corrosion, friction.



(*Above*) **FRESHLY LAUNDERED DOCUMENTS** at the National Archives come from the ironing machine with the paper smooth, and the ink restored to its pristine sharpness and legibility. Under the combined heat and pressure of a common electric ironer, both ink and paper regain qualities originally bestowed by modern production methods. Cyanamid supplies to both paper and ink makers a long list of high-grade chemicals.

American Cyanamid & Chemical Corporation

30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

*Trade-mark of American Cyanamid & Chemical Corporation applied to wetting agents of its own manufacture.

**Registered Trade-mark of American Cyanamid Company. These resins are manufactured under one or more U. S. Patents.

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CITRIC ACID
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TARTARIC ACID
CREAM TARTAR
ROCHELLE SALT
SEIDLITZ MIXTURE
TARTAR EMETIC
BISMUTH SUBNITRATE
BISMUTH SUBCARBONATE
BISMUTH SUBGALLATE
CHLOROFORM
POTASSIUM IODIDE
SODIUM IODIDE
IODINE RESUBLIMED
CALOMEL
CORROSIVE SUBLIMATE
RED PRECIPITATE
WHITE PRECIPITATE
AMMONIUM CITRATE
ASCORBIC ACID
ISO ASCORBIC ACID
POTASSIUM CITRATE
SODIUM CITRATE
PHENOLPHTHALEIN
FERRIC AMMONIUM CITRATE
FERRIC AMMONIUM OXALATE
FERRIC SODIUM OXALATE
STRYCHNINE

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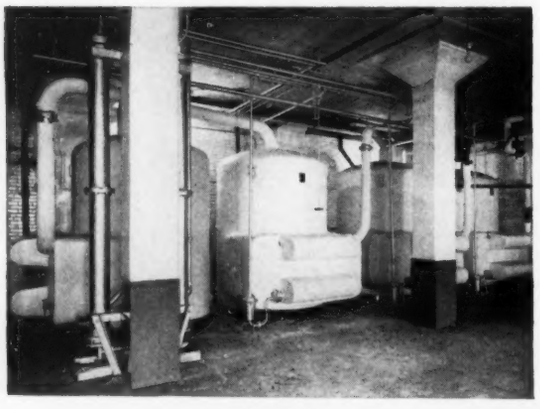

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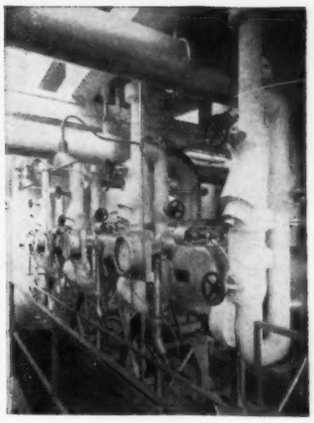


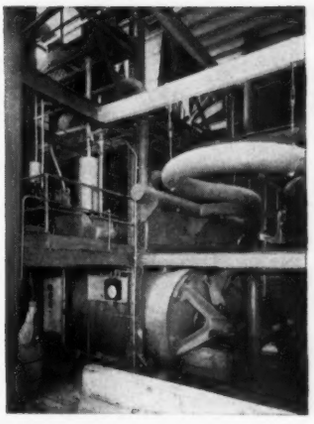
CONTROL

SINCE 1849 . . . . . The House of Chas. Pfizer & Co., Inc. was established in 1849, when the City of New York had something less than half a million inhabitants and industries of a scientific and technical character were in their pioneer stage.

Chas. Pfizer & Co., Inc. has always emphasized modern methods of manufacture and high standards of quality. Of its own initiative it has contributed notably to the expansion and improvement of the chemical materials of industry and of fine chemicals used in the field of medicine. Its technical and research staffs are outstanding in the industry. Its scientific development has been continuous for 90 years.

Age is an asset of value to a business enterprise which has maintained its integrity and keeps pace with advances in modern science and the increased exacting demands for products of outstanding quality

Booklet sent on request, detailing our products and facilities.

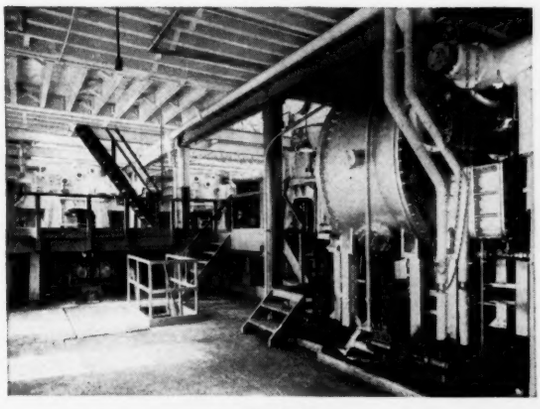


MODERN EQUIPMENT

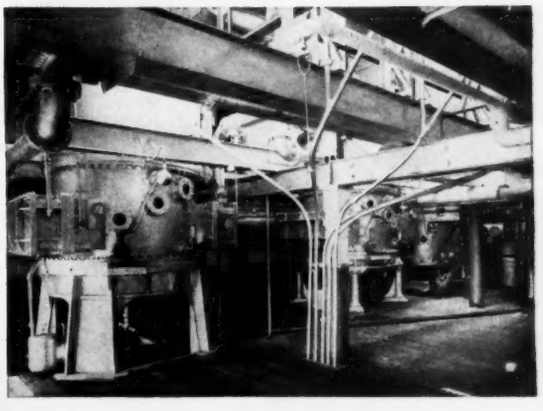
CHAS. **PFIZER** & CO., INC.

Manufacturing Chemists

81 MAIDEN LANE, NEW YORK 444 W. GRAND AVENUE, CHICAGO, ILL.



CAPACITY

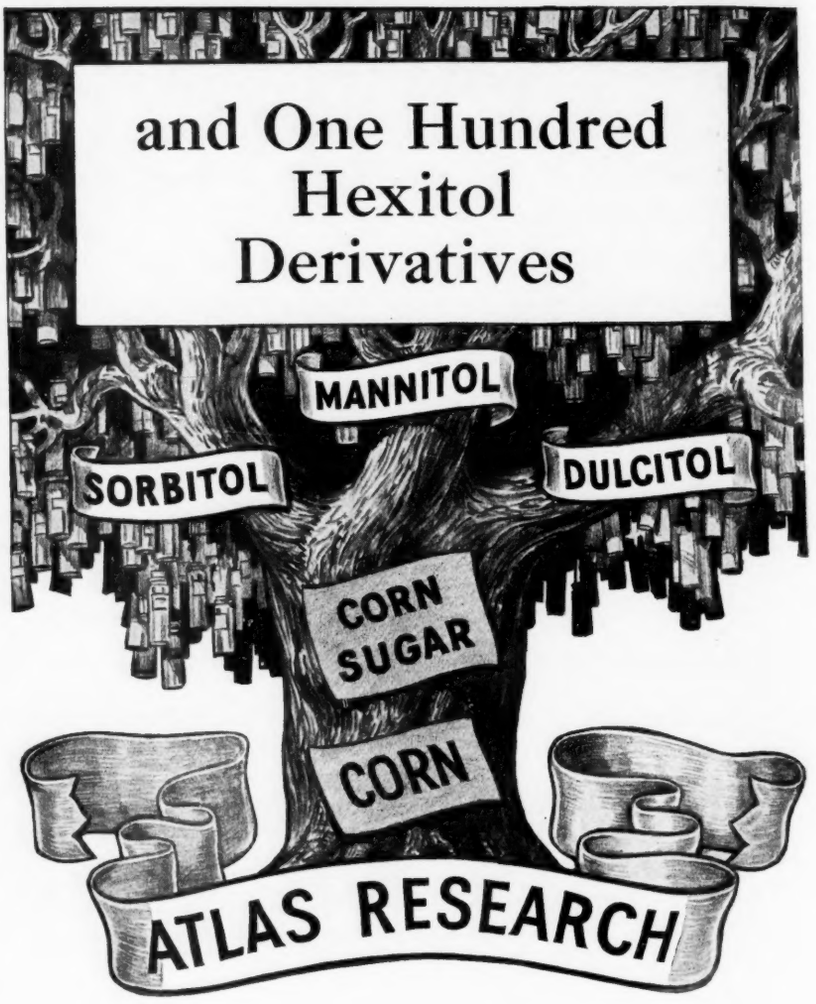


EFFICIENCY

CHEMICALS UNDER CHAS. PFIZER & CO. INC. MANUFACTURING CHEMISTS NEW YORK **THIS SEAL . .**

EST. 1849

Mannitol–Sorbitol–Dulcitol–



Ripe with possibilities for the industrial chemist is the "family tree" of Atlas Hexitol Derivatives.

Originally, one of the "hexitols"—Sorbitol—was introduced to round out the action of glycerine as a softener and plasticizer. Its efficiency was proved in an increasing number of industrial applications, from paper and tobacco to leather and print rolls.

Now Atlas has paved the way for over a hundred hexitol derivatives ready to play their parts in product and process development. Some are emulsifiers; others softeners; others penetrants, plasticizers, stiffeners, hardeners. Many have destinies still unknown.

Among these hexitol derivatives may well be found some materials to make the visions of the industrial chemist commercially practical.

They will be on display at the Exposition of Chemical Industries in New York.

Visit Atlas at Booth 46, at the Chemical Show, New York, December 4-9.

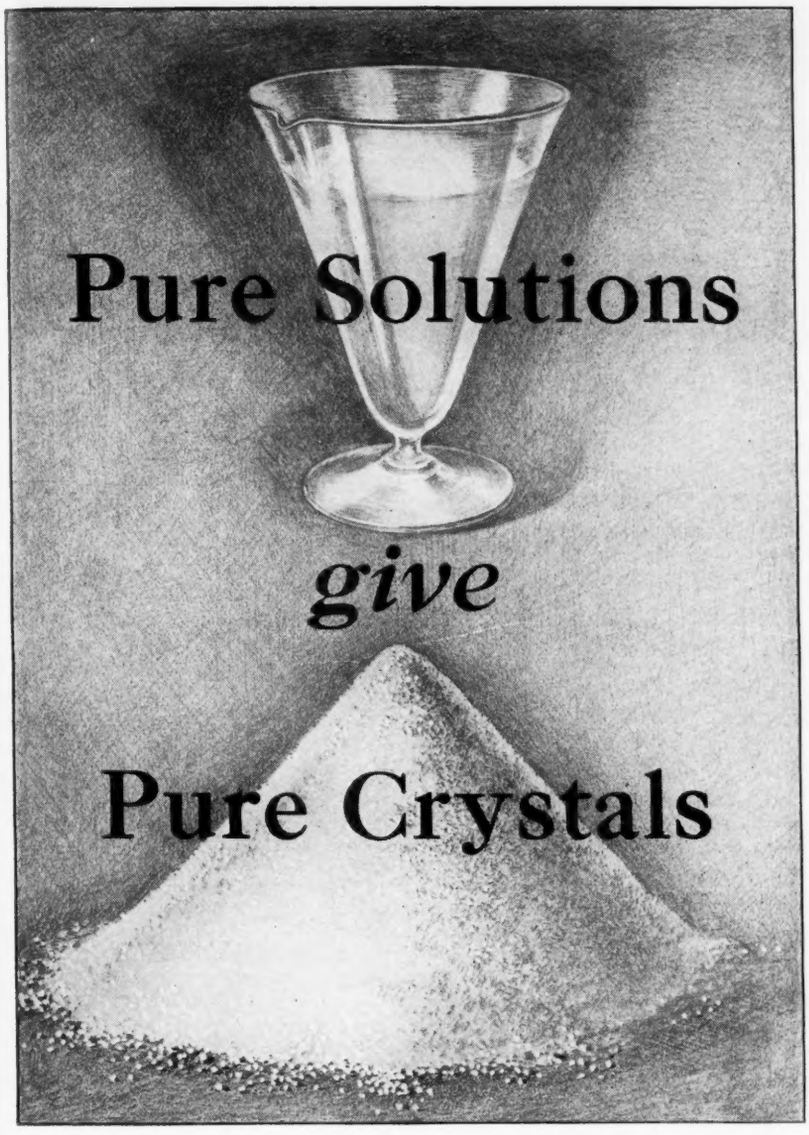
INDUSTRIAL CHEMICALS DEPARTMENT

ATLAS POWDER COMPANY

Wilmington, Delaware

European Representative

HONEYWILL & STEIN, Ltd.
21 St. James's Square
London, S. W. 1, England



Traces of color, odor, or taste always leave a suspicion of impurity—a suspicion that retards sales.

Darco removes these traces of color, odor and taste by removing impurities *before* crystallization. The results are immediately apparent in a more saleable crystal, a more saleable product.

In addition, Darco helps to produce a larger yield, because some of the impurities removed by Darco are those which tend to retard crystallization.

With remarkable economy and efficiency, Darco activated carbons provide a surpassing degree of purity—a final touch that simply cannot be had economically by other means.

Darco technical men are ready to help put the Darco process on a practical production basis in your plant.

Visit Darco at Booth 46, at the Chemical Show, New York, December 4-9.

DARCO

DARCO
CORPORATION

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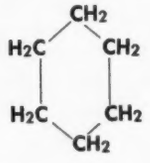
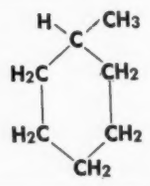
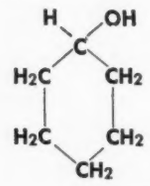
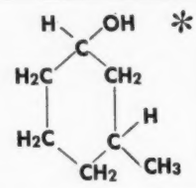
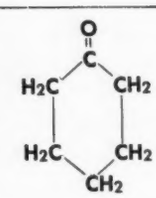
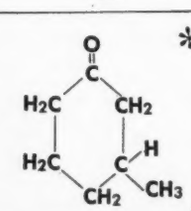
Are you acquainted with of the *Barrett*

	STRUCTURAL FORMULA	SPECIFICATIONS
CYCLOHEXANE 98-100% M. W. 84.15 B. P. 80.8° C.		Color: Water white—less than 20 Hazen Specific Gravity at 25°C/4°C: 0.773-0.775 Refractive Index at 25°C: 1.423-1.427 Solidification Point: Above 1°C (33.8°F) Distillation Range: 79.0°C-82.0°C 95% distills within: 1.5°C Water content: Less than 0.2%
METHYL CYCLOHEXANE M. W. 98.18 98-100% B. P. 101.2° C.		Color: Water white—less than 20 Hazen Specific Gravity at 25°C/4°C: 0.763-0.766 Refractive Index at 25°C: 1.419-1.422 Distillation Range: 100.0°C-103.0°C 95% distills within: 2.0°C Water content: Less than 0.2%
CYCLOHEXANOL M. W. 100.15 98-100% B. P. 160.7° C.		Color: Water white—less than 20 Hazen Specific Gravity at 25°C/4°C: 0.943-0.946 Refractive Index at 25°C: 1.463-1.465 Solidification Point: Above 20°C (68°F) Distillation Range: 158.0°C-162.0°C 95% distills within: 3.0°C Water content: Less than 0.2%
METHYL CYCLOHEXANOL M. W. 114.18 98-100% B. P. 172.0-175.3° C.	 *	Color: Water white—less than 20 Hazen Specific Gravity at 25°C/4°C: 0.911-0.916 Refractive Index at 25°C: 1.456-1.460 Distillation Range: 169.0°C-176.0°C 95% distills within: 5.0°C Water content: Less than 0.2%
CYCLOHEXANONE M. W. 98.14 98-100% B. P. 155.6° C.		Color: Water white—less than 20 Hazen Specific Gravity at 25°C/4°C: 0.941-0.945 Refractive Index at 25°C: 1.446-1.451 Distillation Range: 151.0°C-157.0°C 95% distills within: 3.0°C Water content: Less than 0.2%
METHYL CYCLOHEXANONE M. W. 112.16 98-100% B. P. 169.0-170.5° C.	 *	Color: Water white—less than 20 Hazen Specific Gravity at 25°C/4°C: 0.910-0.914 Refractive Index at 25°C: 1.442-1.446 Distillation Range: 165.0°C-171.0°C 95% distills within: 4.0°C Water content: Less than 0.2%

†True Boiling Point

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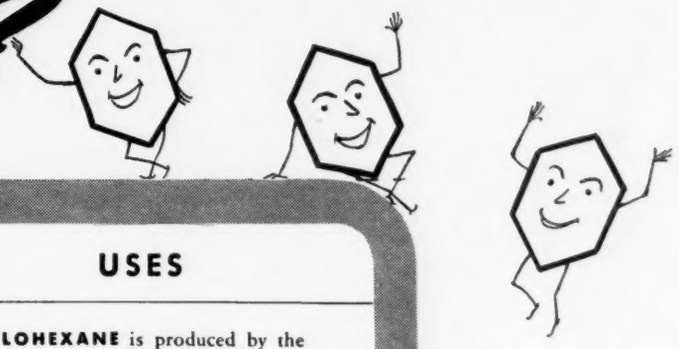
America's leading manufacturer

COAL-TAR CHEMICALS

these new members

Family?



OTHER PROPERTIES

Acidity	Neutral
Effect on Metals	Non-corrosive
Residue from Evaporation	None
Approximate Evaporation Rate (Toluene = 100)	195
Flash Point (approximate)	Less than 10°F
Solubility in Water at 20°C	Insoluble
Pounds per Gallon	6.5

Acidity	Neutral
Effect on Metals	Non-corrosive
Residue from Evaporation	None.
Approximate Evaporation Rate (Toluene = 100)	140
Flash Point (approximate)	Less than 10°F
Solubility in Water at 20°C	Insoluble
Pounds per Gallon	6.4

Acidity	Neutral
Effect on Metals	Non-corrosive
Residue from Evaporation	None
Approximate Evaporation Rate (Toluene = 100)	8
Flash Point (approximate)	68°C (155°F)
Solubility in water at 20°C (approximate)	4-5 %
Pounds per Gallon	7.9

Acidity	Neutral
Effect on Metals	Non-corrosive
Residue from Evaporation	None
Approximate Evaporation Rate (Toluene = 100)	4
Flash Point (approximate)	68°C (155°F)
Solubility in Water at 20°C (approximate)	3-4 %
Pounds per Gallon	7.6

Acidity	Neutral
Effect on Metals	Non-corrosive
Residue from Evaporation	None
Approximate Evaporation Rate (Toluene = 100)	30
Flash Point (approximate)	47°C (116.5°F)
Solubility in Water at 20°C (approximate)	8-9 %
Pounds per Gallon	7.9

Acidity	Neutral
Effect on Metals	Non-corrosive
Residue from Evaporation	None
Approximate Evaporation Rate (Toluene = 100)	20
Flash Point (approximate)	53°C (128°F)
Solubility in Water at 20°C (approximate)	2-3 %
Pounds per Gallon	7.6

USES

CYCLOHEXANE is produced by the hydrogenation of benzene.

METHYL CYCLOHEXANE is produced by the hydrogenation of toluene.

These cyclic hydrocarbons are excellent solvents for most oils, fats and waxes. They also dissolve many other materials, including crude rubber, bitumen and ethyl cellulose. They have application in extraction, recrystallization of fine chemicals and degreasing. The two chemicals have many common uses and in numerous instances are interchangeable, depending on the boiling point and evaporation rate desired.

CYCLOHEXANOL is produced by the hydrogenation of phenol.

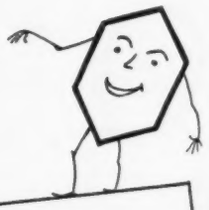
***METHYL CYCLOHEXANOL** is a mixture principally of two isomers produced by the hydrogenation of metaparacresol.

These cyclic secondary alcohols are solvents for most oils, fats, waxes and many natural and synthetic resins. They have applications as aids in wetting-out, as emulsion stabilizers, homogenizers and blending agents. They are of especial value in soaps and have use in lacquers, plastics, polishes and many other preparations.

CYCLOHEXANONE is produced by the incomplete hydrogenation of phenol.

***METHYL CYCLOHEXANONE** is a mixture principally of two isomers produced by the incomplete hydrogenation of metaparacresol.

These cyclic ketones are excellent solvents. They dissolve cellulose esters, cellulose ethers, and crude rubber. In addition, they are solvents for oil, fats, waxes and most of the natural and synthetic resins. Methyl cyclohexanone is widely used in lacquers of the crystallizing type. Both have application in lacquers, enamels, inks, polishes and the resin industry.



TECHNICAL ADVICE AND EXPERIENCE AT YOUR SERVICE

The Barrett Company will welcome an opportunity to discuss with you possible applications of its new series of hydrogenated products.

Because of their extremely high purity these chemicals are especially valuable in organic syntheses involving saturated ring structures.

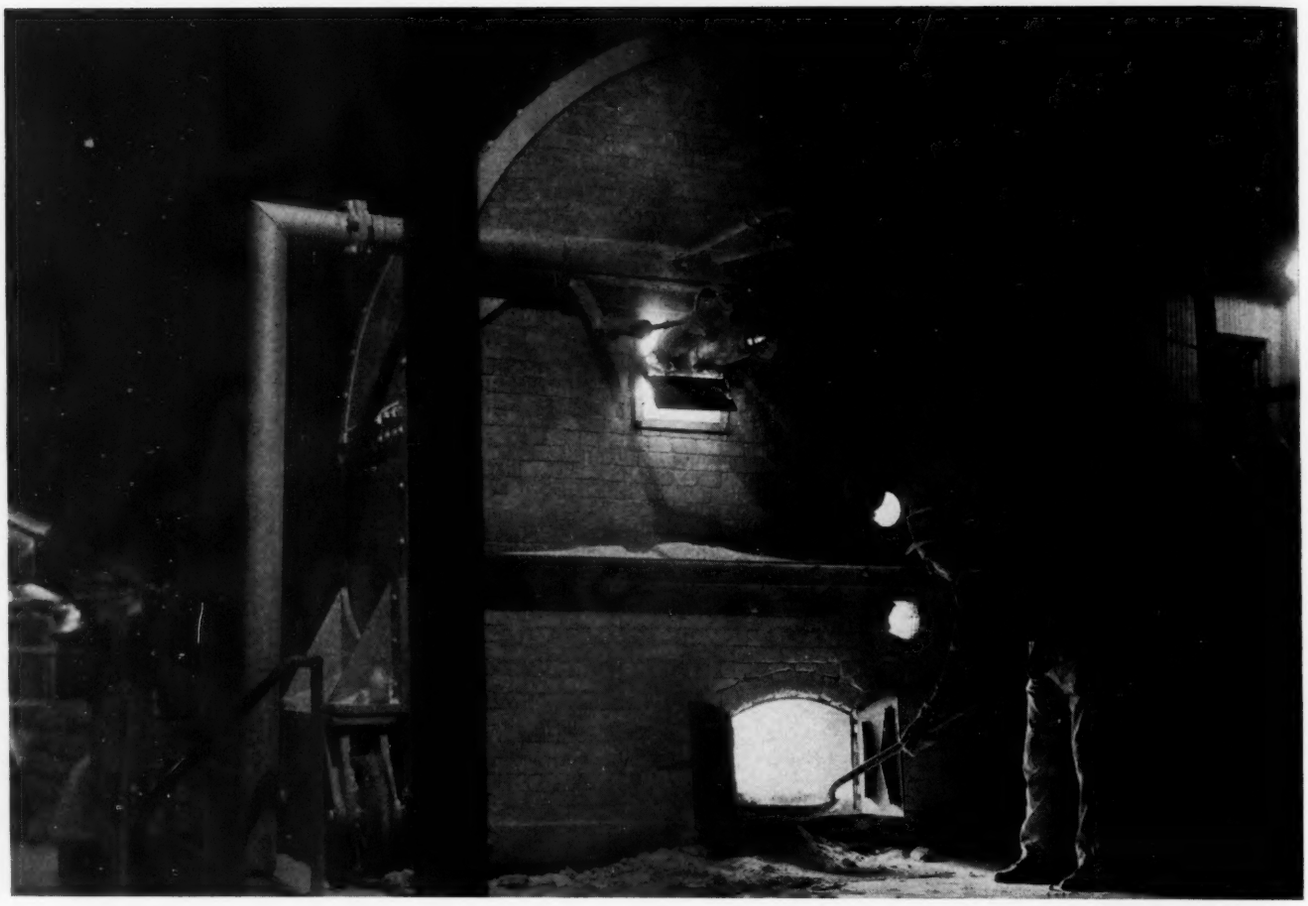
The advice and experience of the Barrett Technical Staff are at the service of anyone interested in the possible application of these products in their own processing.

Barrett CHEMICALS

40 Rector St., New York, N. Y.

of coal-tar chemicals

ROOFINGS • TARVIA



The HOT END of a Rotary Kiln in which DICALITE rock is subjected to controlled temperatures to remove moisture—one of the many steps in the processing of DICALITE Filteraids and other products.

Bring your Clarification Problems to FILTRATION *Headquarters*

LET DICALITE Filtration Engineers tell you *how* you, too, can get *sparkling* clarity of your products at LOWER cost per unit of finished product. These men have devoted the major parts of their lives to filtration service. They will gladly tell you the story of DICALITE Filteraids and give specific recommendations on the right grade and amount of these tiny aids to positive clarification to meet your operating conditions.

Headquarters also for these DICALITE Products

DICALITE Paint Extenders and Flatting agents; DICALITE Fillers for Plastics, asphalt and resin compounds, paper, polishes, rubber, linoleum, etc.; DICALITE Insulating Materials; DICALITE for Uniform Concrete; DICALITE for Asphalt; DICALITE Insecticide Carrier.

FILTERAIDS INSULATION ADMIXTURE ABSORBENTS FILLERS

THE DICALITE COMPANY

520 N. Michigan Ave. CHICAGO
120 Wall St. NEW YORK
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PRODUCTS OF UNIFORM SUPERIOR PERFORMANCE

WHICH OF THESE COMMON SHIPPING WORRIES WOULD YOU LIKE TO WHIP?

1.
DAMAGE BY MOISTURE AND CONTAMINATION.
2.
COSTLY FILLING AND HANDLING OPERATIONS.
3.
HIGH CONTAINER COST AND EXCESSIVE SHIPPING WEIGHTS THAT MAKE DELIVERED PRICES HIGH.
4.
POOR APPEARANCE OF CONTAINER ON ARRIVAL.
5.
LOSS OF QUALITY THROUGH ESCAPE OF DESIRED MOISTURE CONTENT.

These and other common shipping problems are being solved for chemical and mineral products in the Bemis Shipping Research Laboratory

Your containers not only carry your product . . . they carry the life of your business. Nowhere is this more true than in the chemical and mineral industry.

Yet such common problems as those above have long been accepted as necessary evils in the shipment of these products. Manufacturers, therefore, have welcomed enthusiastically the Shipping Research Laboratory in which Bemis technicians are solving these problems with splendid results in increased sales and lowered costs.

Realizing that no two companies face exactly the same problems, the Bemis Shipping Research Laboratory studies your particular needs, submits a report, and should a change in containers be needed, makes recommendations. There is no obligation.

Let Bemis analyze your container set-up for sales and profit opportunities

Get in touch with us at once or send for our special brochure telling about this service and giving helpful suggestions for better shipping. Mail coupon today.

Waterproof Department

BEMIS BRO. BAG CO.

407 Poplar Street, St. Louis • 5104 Second Avenue, Brooklyn

BEMIS BRO. BAG CO.
407 Poplar St., St. Louis, Missouri
5104 Second Ave., Brooklyn, N. Y.

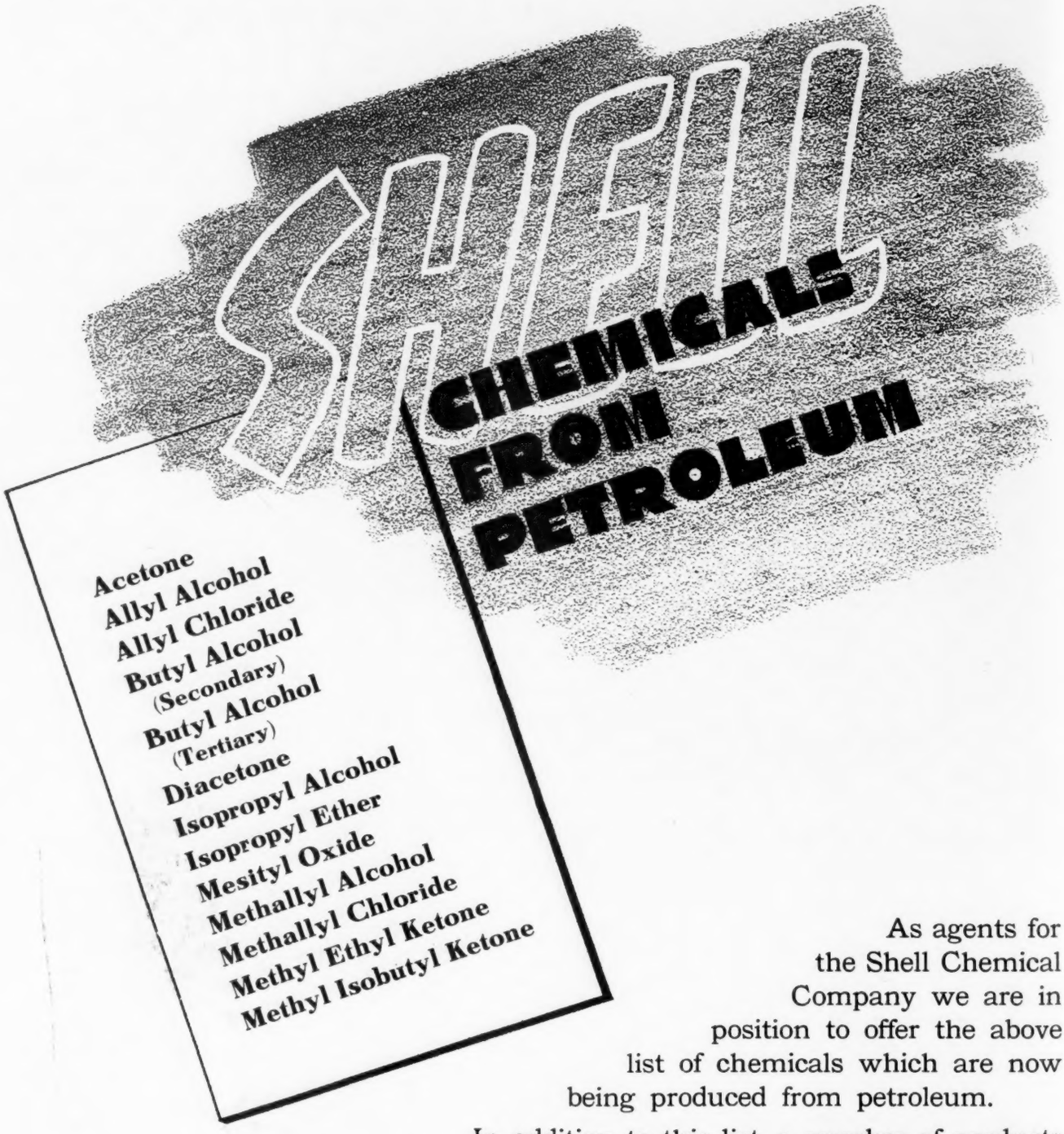
Please send your special brochure and details about use of Bemis Waterproof Bags for_____ (Product)

*Firm Name*_____

*Street Address*_____

*City*_____ *State*_____

*Mark for the attention of*_____



As agents for the Shell Chemical Company we are in position to offer the above list of chemicals which are now being produced from petroleum.

In addition to this list, a number of products are available in semi-commercial quantities, the manufacture of which can be readily developed as economic and market conditions become favorable.

Selling Agents for

SHELL CHEMICAL COMPANY

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what it means to you

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R. & H. CHEMICALS
for All Industries

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NON-FLAMMABLE SOLVENTS
DRY-CLEANING FLUIDS
REFRIGERANTS
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PEROXIDES
CYANIDES
SODIUM, 99.9%
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★

THE 137 continuous years of chemical manufacturing have identified the du Pont Company as a dependable source of supply for chemicals and chemical products. Basic industries as well as highly specialized manufacturers have been helped in their progress toward reduced costs and improved products by the Company's broad research program for the production of materials which are cheaper, better and more easily utilized. The many customers and firm friends, made and retained through the years, are the conclusive evidence of this policy.

★

That many millions of dollars of du Pont chemicals are sold, and used annually, is an expression of confidence and satisfaction in the company, its representatives, its management, the quality of the products and the service which was rendered. It is a confidence in the mature experience and reliability of the du Pont Company . . . an endorsement of its continuous and far reaching program of research which is constantly seeking to improve products and to create new chemicals for industry.

★

You, as a consumer of chemicals, are more concerned with the total cost per unit of finished saleable products than with the cost per pound of the chemicals used in making or processing the product. Your manufacturing program and profits are founded on the assurance of a steady supply of chemicals which meet your specifications or requirements.

★

Through continuity of research and manufacture du Pont has contributed its share of such chemicals for practically every industry and with them the skilled technical assistance which has helped many manufacturers to reduce processing time, improve their methods and lower costs.

DU PONT
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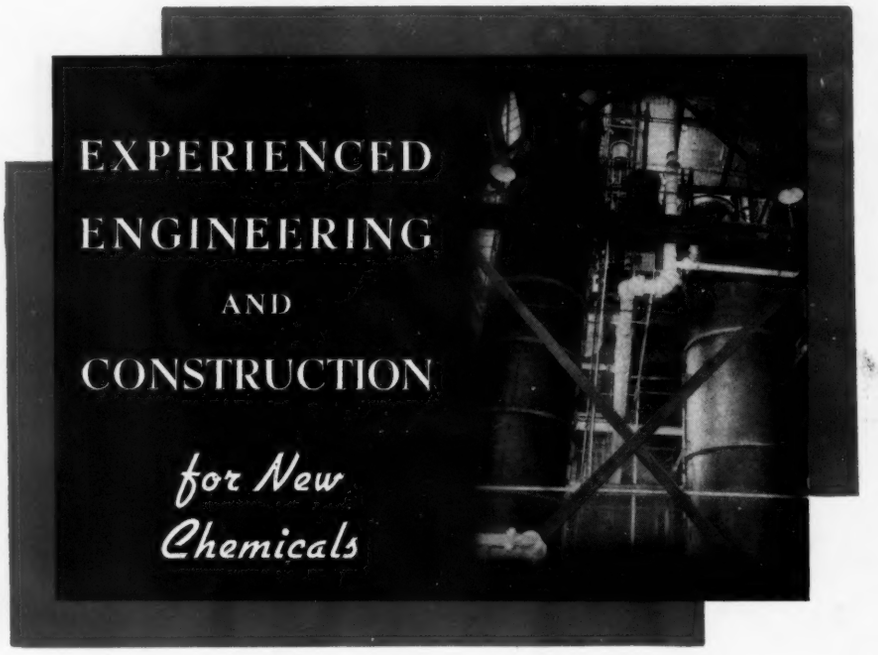
The R. & H. Chemicals Department
E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Wilmington, Delaware

District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco



To those planning new enterprises, it may be of interest to learn that much of Badger's work of late has been "complete plant" work in connection with the development of new processes and the production of new chemicals. Among these are: Catalytic Cracking, Petroleum Derivatives, Nitro-Paraffins, Synthetic Organic Chemicals, By-Product Coke Chemicals. To this work is brought a balanced organization having the combined skill of different specialists in processing and the experience of a large staff of engineers and draftsmen together with a full force of manufacturing and construction men.

E. B. BADGER & SONS CO.

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•

Chemical Engineers and Contractors
Specializing in Distillation, Evaporation
Extraction and Solvent Recovery

Is your REPUTATION *in the balance*

every time you ship in drums?

● **Your reputation travels with every drum you ship. The only way to protect it is to protect every drop of your product in every drum you ship. And the sure way to do this is to use Tri-Sure Closures—the closures that put an end to every hazard of transportation.**

Leakage? Waste? There's no chance of it with Tri-Sure Closures, because the Tri-Sure plug and seal are positively leak-proof.

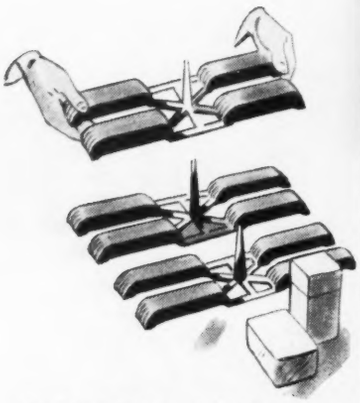
Tampering? Pilferage? Substitution? They are impossible with Tri-Sure on guard, because the Tri-Sure seal cannot be removed without deliberately destroying it.

Think what it is worth to you to make every customer a pleased customer—and every shipment a safe shipment for your product and prestige—and you will know how much it is worth to you to use Tri-Sure Closures.

AMERICAN FLANGE & MANUFACTURING CO. INC.
30 Rockefeller Plaza, New York

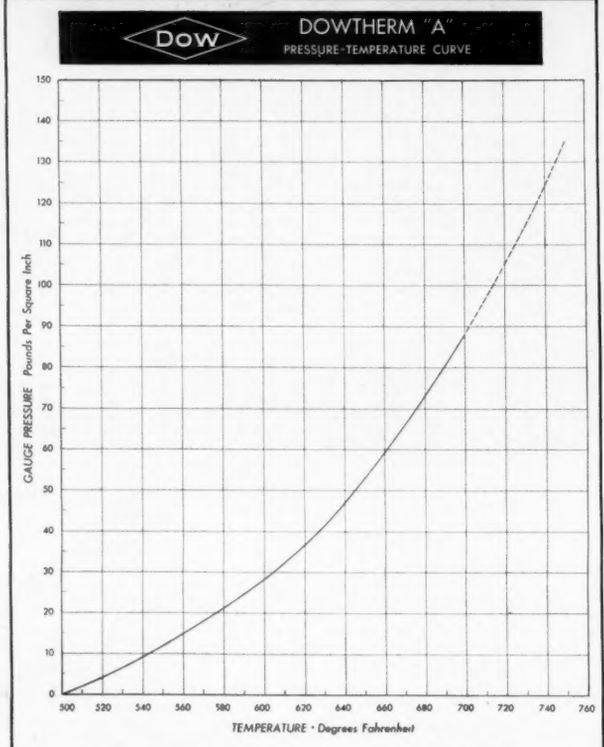
Tri-Sure
CLOSURES
Make Every Shipment a Safe Shipment

CHEMICALS INDISPENSABLE TO INDUSTRY



MOLDING PLASTICS

DOWTHERM



DOWTHERM* gives process industries a superior heat transfer medium for high temperatures without pressure. For example, at 545° F., the pressure exerted by DOWTHERM is only 10 lbs. per square inch as against nearly 1000 lbs. for steam at the same temperature. Thus it eliminates the ever-present dangers of high pressures and the greater initial and operating costs of high pressure equipment.

DOWTHERM can be successfully applied with temperatures as high as 750° F. We will be glad to advise you of modifications in your present equipment necessary for the use of DOWTHERM.

For more information, write for the booklet, "DOWTHERM for High Temperature Heat Transfer Systems."

THE DOW CHEMICAL COMPANY
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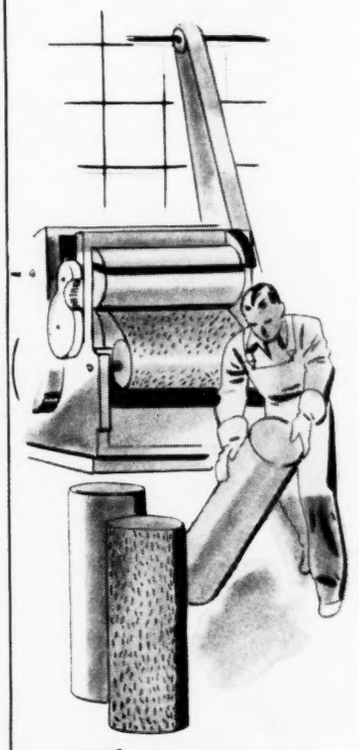
Branch Sales Offices: 30 Rockefeller Plaza, New York City; Second and Madison Streets, St. Louis; Field Building, Chicago; 9 Main Street, San Francisco; 4151 Bandini Blvd., Los Angeles.
*Trade Mark Reg. U. S. Pat. Off.

FOOD PROCESSING

REFINING PETROLEUM



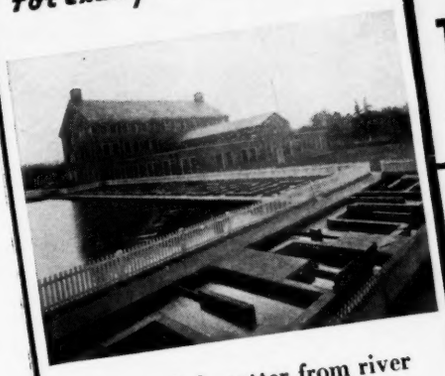
HOT MELT COATINGS

TINNING METALS

PRODUCERS OF OVER 300 DOW CHEMICAL PRODUCTS

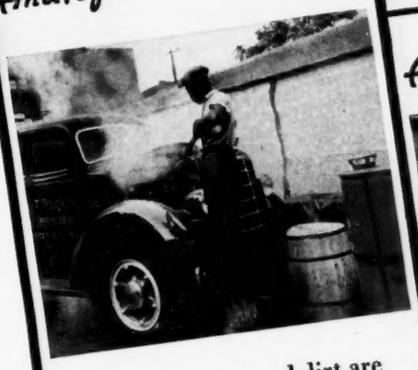
DISPOSE OF UNWANTED MATERIALS QUICKLY AND ECONOMICALLY

For example: (COAGULATION)



Suspended matter from river or lake is flocculated quickly, with the aid of PQ Silicate so that a clear effluent results. Rates of filtration are also increased. Thus various industrial waste disposal problems find economical solution thru PQ Silicates.

And, of course: (CLEANING)



Grease, oil, grime and dirt are removed efficiently from all sorts of surfaces—glass, metal, fabric—by Metso Detergents. Soluble silica in these detergents keeps dirt dispersed and prevents re-settling. And the balanced properties of Metso give more cleaning for less cost.

Also here: (ORE FLOTATION)

PQ Silicate of the correct type causes undesired particles to sink, floating the valuable minerals such as gold, lead, zinc, tungsten. Recoveries from tailings and lean ores also are made commercially profitable with the silicate of soda reagents.

PQ

Silicates of Soda

MAYBE the separation of wanted materials from those unwanted in your process is different from any of these specific cases. Remember PQ Silicates' versatile properties can be adapted to many other uses. Let's talk over your problem soon.

PHILADELPHIA QUARTZ COMPANY

General Offices and Laboratory: 125 S. Third St., Philadelphia, Pa. Chicago Sales Office: Engineering Bldg. Sold in Canada by National Silicates Ltd., Toronto, Ont. Nine plants. Distributors in over 60 cities.

A TIP

to users of BICHROMATE

It is frequently said that "all bichromate is the same." Taken as a whole, that is true. But more thorough research in many lines has proved that all bichromate does not *act* the same.

So during the past few years we have been producing our *specification* types of bichromate to meet the exact requirements of our many customers.

May we develop a type specifically for you?

Natural BICHROMATES

Natural Products Refining Co., 904 Garfield Ave., Jersey City, N. J.

CHEMICAL INDUSTRIES

The Chemical Business Magazine

Established 1914

Silver Jubilee Number

The Coming Quarter Century

WE live at a moment when far-reaching deeds are desperately committed amid great confusion of thought. When new, curious definitions—upon whose meaning hardly three of us will all agree—are given to such fundamental conceptions as loyalty and patriotism, thrift and honesty, even faith, hope, and charity, it is inevitable that the plans and policies of governments, of finance, of industries, of trade, even of bewildered individuals, should swirl in a confused and conflicting maelstrom.

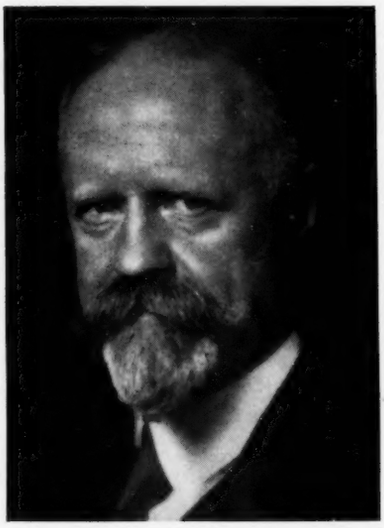
In this engulfing turmoil the shape of things to come is completely blacked out. We cannot see ahead clearly. We can only with great difficulty and extraordinary risk grope our way forward. When we can plan ahead for scarcely a month's operations of our own business, how may we foresee the development of the chemical industry twenty-five years hence?

Yet in the midst of all the murky contradictions of today, we find one section of our world where thought is temperate and logical and where action is richly fruitful. Only in Science and its application through technology do we find unquestioned sanity and tangible progress; and it is quite typical of our muddle-headedness that at the peak of scientific achievement, a strident voice of criticism and denunciation is for the first time in all History, raised against scientific advance. "Plough under invention!" is shouted at the moment when research has turned our earthly economy from one of want and waste to one in which peace and plenty have at last become at least practical objectives.

We of the chemical industry can find here something substantial to grip. No industry is so firmly grounded upon scientific verities. No other industry so habitually employs the scientific mode of thought or applies so directly the results of scientific discovery. And, if science is ultimately to emerge as the controller of the direction and the speed of human activities, then our position in the future is indeed important. Not only will our products become of increasing importance, but our methods also may serve as a pattern for industrial progress that will make a reality of the promise of a world of security and of abundance.

1914 1939

"Chemical Industries" and the Chemical Industry



By William B. Bell

President

American Cyanamid Company

"SHOW me what a man reads and I will tell you what manner of man he is."

Tested by this familiar adage the chemical industry may well be proud of its record. This is especially true of the current publications that keep us up to date. Several excellent journals cover our field. Among these none is better known or of more value to the manufacturer of chemical products than "Chemical Industries." Here is a publication which grew up with the chemical industry in the United States. It was started in August 1914 by David Oliphant Haynes, who had been engaged in business publication enterprises since 1885. He was one of the pioneers in this field and at that time published three other business magazines. When the paper began, it was a self-covered bulletin called "Weekly Drug Markets" designed primarily to supply the war time need for a prompt, disinterested price and news service.

From the beginning the editorial policy of "Weekly Drug Markets," and its successor "Chemical Industries," supported the best interests of the American Manufacturer. An outstanding example of this attitude arose out of the World War. During the war when many felt that Germany would promptly regain her dominance in coal tar chemicals, this was the first paper wholeheartedly and vigorously to uphold the American point of view. At the close of the war it took an active part in the fight for an adequate dye tariff. Met with the suggestion that such a tariff would enable certain of the larger companies to monopolize the dye field, the magazine issued a special number reviewing the work and products of all the smaller companies. The final passage by Congress of a bill providing for a tariff on dyes marked the successful conclusion of this campaign of education and made possible an independent production of dyes for America by American producers.

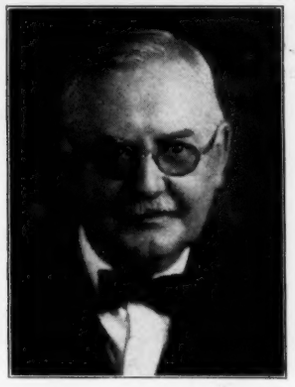
No history of "Chemical Industries" or of the growth of the chemical industry can be complete without mention of the man who was for many years publisher and editor of the publication, Williams Haynes. Founded by his father, the magazine was purchased by the son in 1919. At his own expense he fought valiantly in the battle for an American dye industry. He went on speaking trips as far West as St. Louis and Chicago. He engaged in a joint debate at a convention of the Dry Cleaners and Dyers Association at Atlantic City. As a result, that organization turned down a recommendation of its executive committee and passed unanimously a resolution calling upon Congress to protect the dye industry in America.

Immediately following the close of the war, "Chemical Industries," through Mr. Haynes, made further distinct contributions to the development of the industry. In 1922 it established the "Chemical Buyer's Guide Book,"—the first effort to list all legitimate suppliers of chemical products in the United States. Previous to that time the only purchasing guide published had named advertisers alone.

Through the efforts of the magazine and its editor, an organization was started which later developed into the "Salesmen's Association of the Chemical Industry." In the early days this was a very active body. It conducted a course in chemistry for salesmen. In cooperation with the Manufacturing Chemists' Association, it appointed a joint committee, of which Mr. Haynes was chairman, to draft a model form of chemical sales contract. It held many educational meetings.

"Chemical Industries" was also instrumental in changing the Exposition from an annual to a bi-annual affair and in securing on the Advisory Committee representation of chemical producers as well as equipment manufacturers.

As time went on, changing conditions and the growth of the chemical industry caused a sharper distinction to become apparent between chemical and drug



The late
David Oliphant Haynes
Founder

interests. The publication was, therefore, separated into two magazines, "Chemical Markets" and "Drug Markets" (now "Drug and Cosmetic Industries"). The latter was sold a year later to two employees. In 1934, reflecting the change in tions in one straight alphabetical listing,—prices having previously been broken up into heavy and fine chemicals, etc. It was the first to print a definite quantity and position with each quotation. When the magazine became a monthly publication it began for the first time to publish the high and low prices of the present year and the year before for comparison with the current quotations. "Chemical Industries" was the first to quote chemical stock prices, to issue a picture section and to segregate in uniform loose-leaf sheets statistical data.

To celebrate "Chemical Industries" twentieth birthday its publisher caused a special gold medal to be designed for award to chemical executives for distinguished services to the industry. Two of these medals have been so awarded.

For several years at the booth of the magazine at the Chemical Exposition, uniform containers have been displayed showing all of the new products of its advertisers since the previous exposition. Needless to say, this is one of the most complete exhibits of chemicals from all

Haynes has relinquished active leadership of the publication. But his wise council will continue to guide the policies of the institution, while the important

Williams Haynes
Editor and Publisher
1919-1939

post of Managing Editor has been filled by Walter J. Murphy, who for the past nine years has been his right hand.

Thus "Chemical Industries" will continue to play a highly important part in an industry which day by day becomes an even more vital element in American

2 WEEKLY DRUG MARKETS [SEPTEMBER 16, 1914

THE FUTURE OF CRUDE DRUGS

Interviews with Prominent Importers

Real ructions in the drug and chemical markets have not manifested themselves yet and will not until some of the largest wholesale houses and manufacturers begin to fight for material, is the opinion of Mr. Cornelius of P. E. Anderson & Co. The larger manufacturers usually keep on hand two supplies, sometimes enough to last a year, in preparation for poor crops, rainy seasons, or any other contingency, such as this war. Many of these concerns have not bought any supplies in the last six weeks, preferring to "sit tight" and await developments.

A few of the manufacturers became nervous, however, and raided the market, trying to strip the shelves bare to replenish their own stocks, and failing this, have withdrawn from the purchasing field. When they are forced back into the market to bid on commodities, is when prices will give even more perfect imitations of sky rockets than they are now doing, Mr. Cornelius believes.

"The war hardly could have come at a worse time, as far as the drug business is concerned," he said. "Why, two years ago we were better stocked for an emergency than we were this year. Business has been so bad for a couple of years that firms were buying in small quantities, and therefore the importers were ordering from abroad in smaller quantities."

Mr. Cornelius is not enthusiastic over suggested solutions of the drug problem which provide for American production of foreign herbs and plants. He asserted that experiments with belladonna, henbane, and digitalis, in a crop large enough to supply resulted in a crop large enough to supply one retail druggist, and that it would require several years to raise these in quantities sufficient to make an impression in the American trade.

"Abroad many of these herbs and plants grow practically wild," said Mr. Cornelius, "but here they must be cultivated. This year's crop should be picked next month, but it doesn't seem as though there is much chance with all these countries fighting and all the men bearing arms. Many of the reported in the newspapers as having been destroyed in the fields of these countries are the very ones which the United States dare wait until things settle down to replenish my supply. I must buy while I can get the stuff, if I lose a year's profit in so doing. And this is the reason. If I should have to suspend manufacture for thirty days, I would lose all my trade and would have to begin all over again to build up my business. That is because I must keep my customers.

"I am in the habit of using my meticines," he said, "in the same condition," went on the representative. "We are not the only people who did big business because of the panic. Of course, not being dependent upon the means of the consumers for our business, we could go out of business and then return to the field without having anything. Some firms which have made a big profit by the war, but whatever profits are to be made must be made now; because they will get no more material from abroad to sell. When the supplies begin to come in, prices will drop and so will the profits."

OPIUM AND TURKEY'S WAR MOVE.

Interesting Interview with Mr. John McKesson.

Turkey's apparent decision to link her fortunes with Germany and Austria against the allies, seems revealed in correspondence from Smyrna to McKesson & Robbins, of Fulton Street, one of the principal importers of opium.

John McKesson of that firm has received a letter from his agents in Smyrna, dated August 15 last, when, it was explained, shipments of opium were impossible because the railroads were being exclusively for the transportation of troops in the general mobilization of forces. That is the most significant part of the message, as in the next paragraph which said the Turkish Government is requisitioning barley, wheat, flour, sugar, rice and leather, and levying its requisitions on firms rather than nationalities save Germans and Austrians.

The earlier paragraph indicated that Turkey is preparing for war, enough that Turkey is preparing for war, and the latter seemed to show on which side the Ottoman Empire would stake its chances of existence. "All firms which do not deal in any of the six articles mentioned are thanking their stars," the letter continued, "because the latter are regarded as very poor pay."

With such conditions in Turkey, which practically all of the opium consumed because Turkey allied herself with England, she probably could have marketed the crop, as the British navy probably will keep the seas clear. But now, as it seems Turkey will align herself with the Teutons, it is probable the German navy will be bottled up, as the German navy seems unable to keep rested in some quarters that existing laws barring Persian and particularly Indian opium may be modified if the Turkish product is not available."

GERMANY WILL SELL HER DYES

Textile Mills Will Not Be Forced to Shut Down on Account of War

The anxiety which has been widespread among manufacturers of woolens, silks and cotton goods has been considerably relieved by the recent announcement that Germany is willing to permit the shipment of dyestuffs from her factories, and also will allow the Rhine to remain open for such shipments. A number of factories which would apparently have been forced to shut up of the dye industry in this country, and relief was possible from an early building-up of the old-fashioned vegetable dyes were again used, wear white clothes in summer and Winter. Representative Herman A. Metz, of New York, announced in the House, on Aug. 28, that the State Department had received notification, through the American Ambassador at Berlin, James W. Gerard, that the German government would co-operate with representative of this country, who would see to it that the dyes were placed aboard Dutch liners for shipment.

The first tangible result of the campaign was the arrival, on Sept. 8, of the steamer *Rotterdam*, followed a few days later by the *Potsdam*, with another large consignment. The supply will naturally not be restored to its normal status, but the crippling of our textile industries will be prevented by the steady influx of large shipments.

This new arrangement is not only advantageous to the United States, but will serve in some measure to ease the growing unemployment in Germany, which is becoming of serious economic importance.

A greatly lessened domestic consumption, and research of labor, there has arisen the paradoxical condition of widespread lack of employment in the enormous demands of the United States for dyes and other coal-tar colors can be made effective, an outlet is thus afforded for at least part of the product of one of Germany's great industries.

DRUGS VERY SCARCE

The first issue of "Weekly Drug Markets" (now "Chemical Industries") consisted of but 16 pages. It contained no advertising, and not even one illustration.

SEPTEMBER 16, 1914] WEEKLY DRUG MARKETS 3

New York Markets

NEW YORK, Tuesday, Sept. 15.—Just as the operations of the Allies during the last week have been more favorable and fraught with varying degrees of success against the Germans, so has the situation in the drug and chemical markets, as a whole, eased perceptibly. Speculation seems to have fallen off to a certain extent, and buyers are showing an inclination to wait for supplies, at direct variance with their attitude a few weeks ago to lay in stocks at any price.

Since the beginning of hostilities, it has been the consensus of opinion among the better informed, that the success of German arms meant the prolonging of the war—that issued victories by the Kaiser, and invasions, meant just so much more to be consumed by the Allies in driving the enemy back. The first sweep of arms to the suburbs of Paris, and the retreat of the German ing of the Allies, their offensive hold its own frontier has given hope that the termination of the nearer at hand than seemed ek ago. And if hostilities are n at least the seat of war can ntrated if the Russians close ast and the Allies from the a reflection of this spirit ed the change in attitude the drug and chemical

age person hopeful of an European war, and with the first time in favor ce, the effect has been hemical trades and as apprehension and the

ange, increased war s, and lack of bot- are a few of

ping losers by storm at sea, poor crops, and other causes. Some half a dozen of these firms have not purchased a dollar's worth of goods since the war started, is the current report in the trade. Several months hence, if the war continues, when these concerns invade the market, is when real high prices will obtain, and when the small purchaser will be crowded to the wall, unable to meet the offers of his larger competitor.

Further lessening of the strain of shortage is expected in the next ten days, when large shipments of all kinds of drugs and chemicals are expected from England. England has always been a depot for the storage of vast quantities of all crude products, save possibly foodstuffs, and these reservoirs will be opened to the American markets.

That the United States will enter on a period of prosperity never before known, after peace is declared, is the hope that must make up for present "hard times" in the drug and chemical, as well as other lines.

OPIUM—With Turkey apparently on the brink of plunging into the European struggle in an alliance with Germany against the Triple Entente, shipments have stopped absolutely. Uncensored advices to New York from Smyrna indicate that there are two reasons for the lack of shipments. One is the inability of American buyers to pay for the opium because of the foreign exchange situation, caused by Turkey's refusal to deal directly with American banks, and the other is lack of transportation, because the railroads are entirely in the service of the army, which is being mobilized. Until August 14, only 1150 cases of gum had arrived in Smyrna as against 2357 cases in the same date a year ago. Prices for spot gum in New York range from $10 to as high as $13 for drug-glista' quality gum.

the shortage is expected to be overcome by large shipments from England in the near future. Manufacturers here have offered to guarantee to Great Britain that the glycerin will not be refined to a condition permitting its use in the manufacture of dynamite, and it is believed the embargo on the product will be lifted and shipments made, as there is an immense stock on hand in England. Domestic makers are asking 15½@16½c. for the soap lye trade and 17¼@18c. for saponification grade. C.P. glycerin in drums is being quoted at a minimum of 27c. Distillers have made sales of the dynamite grade at 25c. in the last week. More than a million and a quarter pounds, to the value of more than a quarter of a million dollars, were imported in July last.

LICORICE—Some dealers in licorice are asking 15c., although it may be obtained in certain quarters for 30c. A scarcity of Corigliano is described as the cause of the continued jumps in price.

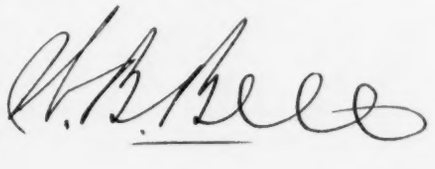
MENTHOL—With arrivals of menthol from Japan following the reported clearance of the Pacific of German warships, there has been a decline in price until $3.25 a drop of 55c. in little more than a week. Spot goods were changing hands at $3.70 early last week, and they fell in ten-cent drops to the new mark, firm offers now being made of $3.15 for case lots. For October shipments from Japan offers of $2.35 cost and freight, in bond, were made in the last couple of days.

SILVER NITRATE—Following an increase in bar silver, domestic manufacturers of the salt have advanced their prices ¾ of a cent from 34 cents in 500 to 1,000-ounce lots. Quotations are a cent higher in 100-ounce lots, and another cent higher or 36½c. in smaller quantities

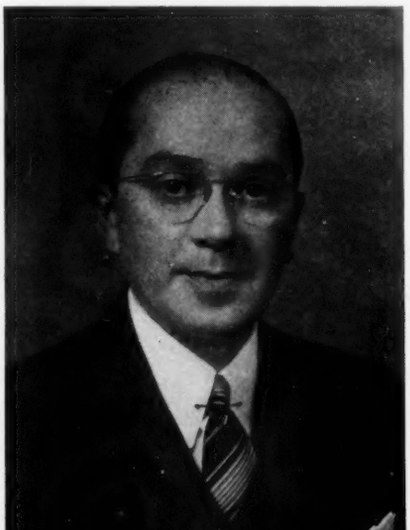
the character of the magazine, the name of the original publication became "Chemical Industries."

"Chemical Industries" has been responsible for other interesting innovations in the chemical publishing field. Several of these changes have since become standard publishing practice. Today they seem obvious. Then they called for ingenuity, judgment and courage. For example, it was the first to publish the price quotasources to be found anywhere. It has been a contribution interesting and valuable to the chemical industry and its customers.

Through changes and revolutionary advancement and during the period of the most virile growth of the chemical industries of America, "Chemical Industries" has faithfully and ably served the manufacturers' interest of the United States. Now, after twenty-five years, Williams life. We honor Williams Haynes for his long and useful service, happily with the promise of many years to come, and we wish prosperity to the great publication which he has so long directed.



The Chemical Bull in the FINANCIAL CHINA SHOP



By Bert H. White

Vice-President

The Liberty National Bank

Buffalo, N. Y.

I HAVE often been told that it is not easy for a man in the chemical industry, in the midst of its rapid technological progress, imbued with the philosophy that greater profits are to be earned by lowering prices so as to win wider markets, to comprehend the mingled delight and dismay with which the financial man surveys his accomplishments.

On the other hand, the banker and investor is equally baffled in his very sincere desire to understand the chemical point of view and to appraise the present and potential values of chemical securities.

Since mutual understanding between so important an American industry and our financial community is obviously desirable, it would appear worth while to put before the chemical executives some of a "country banker's" thoughts. It is hardly necessary for me to disclaim any pretense of being a financial spokesman.

The chemical executive should never forget that the banker, whether he is making a loan or buying securities, is doing nothing else than renting money. Naturally, if he is to continue in business, he must not only get rent (interest) but he must also get his original capital back. We are all of us prone, either through laziness or as the result of experience, to think in formulas, and while it would be hard to demonstrate that the financial brain operates in a groove any straighter or more narrow than does the industrial, or the professional, or the scientific brain, nevertheless each is plainly conditioned to a definite, different point of view. This basic idea of renting capital to be returned plus interest is quite different from the fundamental conceptions of the manufacturer, especially those of the chemical manufacturer.

It explains why the financier is at once delighted to observe that the chemical industries have been exceedingly lucrative investments during the past decade and yet dismayed that the rapid chemical progress is so often upsetting to other industries. The banker must constantly be conscious of both the benefits and the repercussions that arise from new developments in the research laboratories.

Do not blame him, then, if he regards the chemical industry as something of a bull in a china shop. Admittedly, it is a grand, big, strong, vigorous animal. It has plowed through the Great Depression, triumphantly increasing output, introducing new products, lowering prices, paying high wages to more and more men, and withal earning larger profits and paying higher dividends than any other industrial group in the country. Bankers can well salute such a record. They have already acknowledged it with enthusiastic astonishment.

But as we study it more closely we are struck with your high obsolescence and your big depreciation. We like your big investments in plant and equipment. But how can we help wondering how much of this is forced and how much natural investment? We note that much of your profit seems to come from new products—real, constructive creation of new values. But then we find that you have made other products useless or out-moded, scrapping plant and forcing costly readjustments upon other industries; a tangible, destructive cancellation of values.

What About Tomorrow?

You have also broken up some of our time-tested methods of appraisal. No longer can a banker depend upon statistical services like Moody's or Standard Statistics, for they are like the racing form sheets which tell what the horse did in previous races and which are but imperfect indicators of what he will do tomorrow. Nowadays what the banker needs to know in order to rent out his money to the best-paying tenant, is what will happen tomorrow. If past earnings, current position, and book value are the sole bases for determining where the money should be rented—who the tenant should be—the banker may end up owning mortgages on museums instead of partnerships in going and growing companies.

We do appreciate thoroughly the lesson that you have taught us that research is vital in modern industry; that the company without a forward-looking laboratory staff is not playing fair with its stockholders; that the research appropriation is an insurance premium that must be paid lest the company die. But we have also learned from bitter experience that research has been one of the powerful impacts that during the past ten years have made our securities insecure.

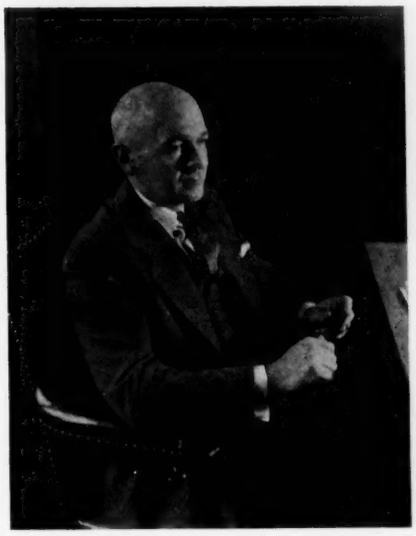
For all this you are not entirely responsible, and yet can you blame the banker for regarding you as a bull in our financial china shop? You certainly cannot blame him for not wanting to catch such a rampant critter by the tail. Indeed, have you not done some things that have helped to create this myth of the ripsnorting chemical Taurus?

In very bullish tones (if you will forgive the pun) you have bellowed the triumphs of your research. Each new product of your laboratories is publicized as of undoubted merit and revolutionary effect. Your leading companies bear down heavily on the enormous costs of development work and offset this by emphasizing the great profits earned by the newer items.

You are justly proud of your progress. It is but human to ballyhoo a new product. But all this creates upon the outsider the false impression that yours is an industry in a turmoil of jittery experimentation.

Talking with responsible chemical leaders one gets a different picture—a truer picture. It appears that after all you do have a very stable foundation of standard products made by established processes. Your growth throughout the depression has been due chiefly to the enormous increase in the production of rayons, plastics, lacquers, and similar chemical substitute materials. Chemical processing in place of mechanical treatment of petroleum, steel and non-ferrous metals, and all the natural textile fibres, has also vastly expanded your basic market. These plain, solid facts have been hidden from us by a pile of propaganda for novelties that but bespangle the fringes of your market. If this be so, and it seems to be, then a table of twenty years' alkali production or a chart showing the growth of acid consumption will portray more glamour to the financial community than the latest rayon stocking encasing the trimmest pair of legs in Hollywood. At least, its impression should prove more lasting.

SIGNIFICANCE of the Industrial Research Laboratories for Chemistry



By R. H. Shainwald

Executive Vice-president

The Paraffine Companies, Inc.

DOES industrial research (many call it technical service) pay? After a little more than a year's trial R. H. Shainwald, executive vice-president of The Paraffine Companies, reports that their Industrial Research Laboratories have completely turned about methods used in several lines of business, have developed half a dozen entirely new products, have modified and improved many others, but the chief gain is in the incalculable amount of good-will the business has built up. "We are definitely now in an era when business will take its research laboratories out into the field to study the problems of its customers at first-hand," he states.

A SIMPLE, rule-of-thumb means of classifying the chemical business is to divide it into three general groups according to their functions—those firms which produce heavy chemicals and other basic raw materials, those primarily engaged in the modification or synthesis of chemicals, and those who use chemicals and chemistry to produce consumer goods.

On the Pacific Coast, most of the chemical-process companies fit either the first or third of these classifications. We have, on the one hand, organizations like American Potash & Chemical Corp., with its extensive operations at Trona in the recovery of natural salts from Searles Lake; or the great oil companies, drawing raw materials from the vast petroleum resources of California and other western states; or the many firms engaged in mining, milling and refining our rich stores of commercial and precious metals; or the enterprises making pectin, citric acid, essential oils, etc., from our Southern California citrus crops. There are many other examples which could be mentioned further to establish the point.

On the other side, we have a great array of companies engaged in the manufacture, by more or less chemical means, of goods which can be sold to the general public. We have soap companies, rubber companies, paint and building material manufacturers, sugar factories, and many other enterprises of similar ilk.

Of the middle group, however, there are comparatively few representatives west of the Rockies. The petroleum firms, it is true, are coming to depend more and more upon synthetic means for achieving the high octane ratings of their superfuels. Some others, also, are interested in the synthesis of certain chemicals. But in general, the Pacific Coast chemical business splits down the middle into raw materials and finished products.

From our beginning, in 1883, The Paraffine Companies and their predecessors have consistently remained in the latter classification. Our first products were paints and roofing materials, both designed to be used as sold. To these we added linoleum and floor-covering materials. The organization became interested in paper manufacture, culminating in the establishment of Fibreboard Products, Inc., which now operates 19 factories in the Pacific Coast states, and which is owned jointly by The Paraffine Companies, Inc., and Crown Zellerbach Corp. Through Fibreboard our interests include Glass Containers, Inc., and we also have large investments in California Ink Co. and Schumacher Wallboard Corp.

It should not be thought from the foregoing that The Paraffine Companies do no more than buy refined raw materials and stir them up to make building and packaging products. On the contrary, we lay great stress upon the fact that in large part the basic substances from which our goods are made—asphalts, felts, pulp, non-metallic minerals, pigments, etc.—either are produced by our own people or are received in crude state and subjected to our methods of refining and preparation. But despite this fact, our chief business is still that of manufacturing consumer goods.

It is, of course, well recognized that research is the foundation upon which the American chemical industries have been erected. There are, however, many kinds of research, and the men responsible for that sort of work in a firm such as ours may well go about their duties in a way

entirely different from that pursued by an organization engaged in the production of coal-tar derivatives or heavy chemicals.

Divisions of Research

True, we have chemists among the forty-odd we regularly employ whose task it is to watch over the quality of our raw materials. Others spend their days studying our processes and formulae, seeking means of reducing costs or improving methods. These activities are more or less common to all phases of chemical industry.

But in that branch of scientific study devoted to the needs and wants of one's customers, there is a broad line of demarkation between the firms making chemicals and those producing consumer goods. Whereas the former are accustomed to dealing with concerns possessed of a considerable knowledge of chemistry, where specifications are well established, the latter are concerned with a vast army of potential purchasers who are not chemists and who for the most part have only a very general idea of what they want and what they possibly could use.

Thus, in most instances it is more difficult for us to determine what lines of investigation will be of the greatest benefit to our customers than it is for an enterprise whose wares will be marketed to businesses whose officials are technically trained and are accustomed to thinking in terms of scientific study, exacting chemical control and precision methods. Also, purchasers of consumer goods are likely to be more diffident about bringing their problems to us for examination than are those who buy materials and substances for subsequent processing and manufacture.

In recognition of this fact, several years ago we began inviting the companies and men with whom we did business to bring their problems and needs to us, to see whether or not we might be of some assistance to them. We soon learned that there was a great field of opportunity for this sort of service—that it promised not only to make many friends for Pabco products, but that it also seemed likely immensely to broaden our sales horizons. While we were helping our customers, we also were discovering a multitude of new uses for our goods, and also many new items or modifications of old ones which we could make and sell at fair prices.

Technical vs. Industrial

Since almost every project we undertook at the behest of an outside firm proved to be of benefit both to that firm and to us, we became more and more interested in what we termed industrial—as opposed to technical—research. Why not, we asked ourselves, take the next logical step and set up a scientific staff which, while its expenses would be defrayed by us, would in actual fact be the property of our customers?

Accordingly, a year or more ago we founded Industrial Research Laboratories Division of The Paraffine Companies. Its headquarters are at our main offices in San Francisco, while its facilities are established in conjunction with our principal plant, at Emeryville, California. To make sure that users of Pabco products understood the functions of the new unit and properly utilized it for their own benefit, we sent into the field a group of men to whom we have given the title technical advisors. Each heads up a small district laboratory, from which he sallies forth to call upon industrial users of our goods. Unlike salesmen, the technical advisors go out looking for trouble. Often they can solve the problems they encounter without referring the matter to headquarters. In any event, they send in thorough reports in which all of the significant factors are enumerated, and thus give our chemists at Emeryville the information they need to investigate the questions which have been raised.

Many-sided Project

It is still too early for a full evaluation of the work of Industrial Research Laboratories. However, in the few months the division has been in existence, it has handled several hundred projects of some importance and countless minor questions. It has completely turned about the methods used in several lines of business. It has developed half a dozen entirely new products for our factories to manufacture. It has modified many others, either to make them suitable for specific purposes or to improve them generally. It has added a whole catalog of new uses for our already-established lines of goods. The number of friends it has made, and the quantity of good-will it has built up for the Paraffine Companies, Inc., is incalculable.

An Unqualified Success

We feel, therefore, that our new division is an unqualified success. As such, we think it marks the end of a period when chemical research took place behind locked doors and was conducted by men who never saw the purchasers of the substances they developed; it is the beginning of an era when business will take its research laboratories out into the field to study the problems of its customers at first-hand.

New Industrial Applications for Metallic Naphthenates

By John S. Trevor

DURING the last year or so several very interesting uses have been found for the metallic naphthenates, apart altogether from their recognized applications as driers in paint and printing ink manufacture. Both copper and zinc naphthenates are now being used to an increasing extent as wood preservatives, particularly for the prevention and eradication of dry rot. The commonest dry rot fungi is *Merulius lacrymans* which is characterized by a soft whitish or greyish growth often splashed by vivid yellow and sometimes purple, especially where light is present. Fruit bodies, thick soft pancake-like growths varying in size, are formed on the more exposed portions, which change in color from fresh to foul as decomposition proceeds. The ripe fruit bodies are striated with irregular characteristic ridges.

Ending Dry Rot

The eradication of dry rot, once established in a building, is expensive and difficult, but extended field tests in Great Britain have demonstrated that a 20% solution of copper naphthenate (11% copper content) in naphtha is one of the most certain poisons for the fungi responsible. The treatment with the copper solution is, in several important ways, preferable to the use of creosote which is liable to diminish considerable in toxicity on exposure to air due to some of the more poisonous and lighter fractions vaporizing and disappearing. Copper naphthenate is equally effective in dealing with other types of fungus, such as *Coniophora cerebella*, which is very resistant to the action of antiseptics, also *Polyporus vaporarius*, the related *Poria incrassata* and *Lenzites*, one of the most dangerous rots of stored timber in the United States. Owing to the value of copper naphthenate as a fungicide, it is now being used in Great Britain as an anti-rotting agent for the treatment of jute sandbags required by the military and also for air raid precaution work. One large firm of dry cleaners in London is now processing some hundreds of thousands of sandbags every week for the large main line railway companies, municipal authorities, schools, etc., and these bags contain a minimum of 0.5% metallic copper in the fibers as attested by guarantee. If the present feverish preparations for war continue there is likely to be greatly increased demand for copper naphthenate for this purpose. It is interesting to record that exposed untreated sandbags have only a life of six or eight months before they become rotten in parts so that the sand or earth falls out. The copper naphthenate ensures freedom from rot for several years, the time depending, of course, on the conditions under which the bags are stored or exposed to the weather.

The anti-rotting treatment used in England, which is fully approved by the War Office, is very simple and consists merely of processing the bags in a proprietary brand of copper naphthenate dissolved in white spirit in rotaries, and then hydro-extracting the wet bags until the correct amount of naphthenate is left in the fibres so as to give 0.5% copper as tested on the ash. The amount of copper solution varies, of course, on the weight of the cloth used for making the bags and the size.

Although some excellent emulsions of copper naphthenate in water have been prepared they have not yet found the applications they deserve, owing probably to the fact that petroleum solvent solutions have much better penetration. It has, however, been suggested as the results of experiments carried out in London, that these emulsions would be of value for the treatment of concrete showing signs of fungus growth. Deep air raid shelters or fortifications, where the humidity of the air is unnaturally high and favorable to the growth of fungi, are the obvious places where treatment of wall surfaces with a fine spray of the copper emulsion would be useful for keeping them free of disfiguring and unhealthy growths. It is not just a question of the unsightly appearance of the affected concrete, but the fact that spores can be blown about by currents of air and so carry infection to other parts. They are also liable to infect exposed food and be inhaled by soldiers and workmen. In the latter case it is considered not improbable by medical authorities that they may be responsible for certain undefined pathological conditions.

The value of copper naphthenate emulsion as a horticultural wash is now receiving some attention. Against green fly it is certainly very effective and it appears to be without any injurious action on the plants themselves. Other types of mildew, such as spinach mildew (*Peronospora Sparca*) and also potato mold are eradicated by means of a spray of the weak emulsion using a dilution of 1 oz. of the concentrated liquor (containing approximately 2.5% copper) to 1 gallon of soft water. At this concentration it is more effective and a good deal cheaper than Bordeaux mixture. As the copper wash is fatal to so many types of mold it would appear to offer some promise as an alternative to Bordeaux mixture for vines, especially as growers recognize the limitations of the latter material.

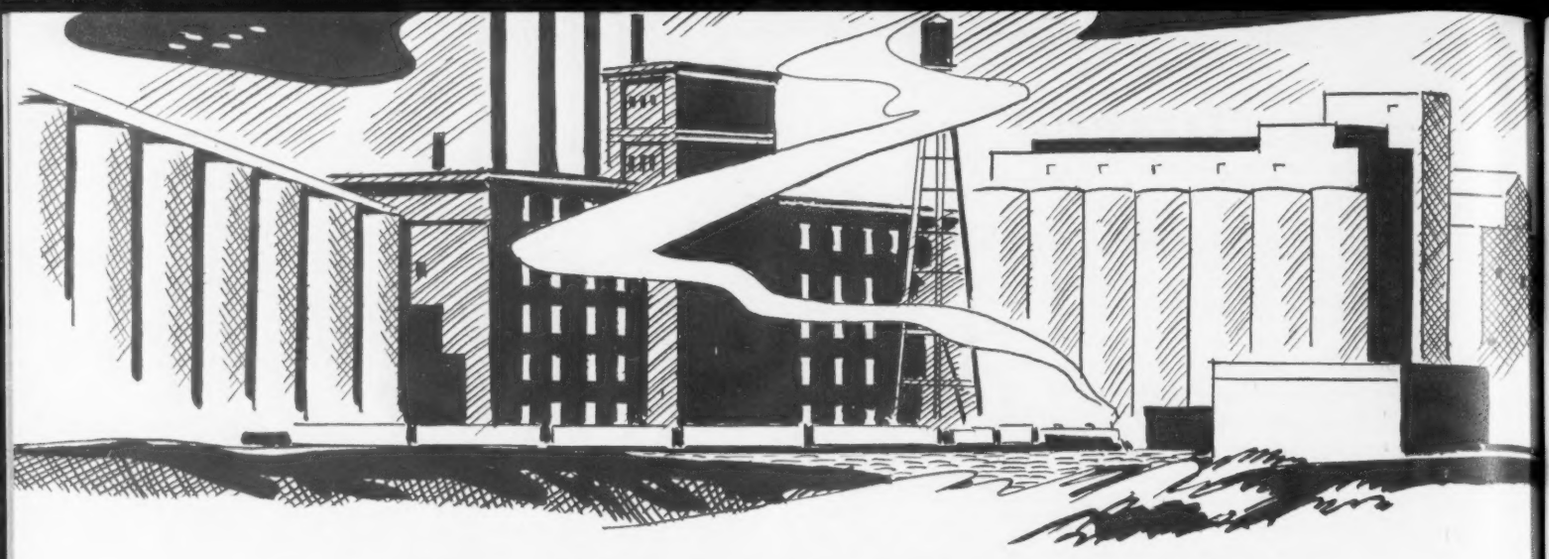
Another interesting use, although a small one at the present time, for the copper naphthenate emulsion is in paper mills for the prevention of fungi growth. Results obtained on a small scale have been very encouraging.

Field tests which have been carried out in Central Africa show that copper naphthenate is also valuable for making wood immune to the attack of termites, but as these tests have not yet been carried out over a sufficiently long period it is too early to draw any definite conclusions. It is, however, correct to say that the copper solution appears to offer interesting possibilities and is more effective than creosote.

Treating Old Timber

In Great Britain some interesting work is now being carried out in the treatment of old timber with a 15-20% solution of copper naphthenate in one of the chlorinated solvents to prevent attack by wood boring insects, and also to eradicate those pests, particularly the Death Watch Beetle, *Xestobium rufo villosum*. Zinc naphthenate is probably used to a greater extent than copper for the protection of wood against the attack of insects. It is sometimes used in conjunction with the copper salt and also with orthodichlorbenzene. Zinc naphthenate is valuable for the treatment of wood attacked by the Furniture Beetle, *Anobium Punctatum*. Repeated applications during June, July and August is recommended as the best and most effective treatment. Other insects readily susceptible to the action of the zinc salt in petroleum solvents are the Powder Post Beetle, *Lyctus*, which is known to cause such serious damage in the furniture and sports goods trades, also Pinhole Borers, Longhorn Beetles and Wood Boring Caterpillars, etc.

Aluminum naphthenate is a tough, transparent, yellow and elastic material which is very difficult to melt and even to dissolve, although it is freely soluble in white spirit. It is usually supplied in the form of a 20% solution in mixed solvents and finds its chief application as a suspending agent, film toughener and impregnating agent. One of the most recent uses of aluminum naphthenate is as an additive to lubricating oils to increase their viscosity and to add a more desirable body. It can also be added to drying oils for much the same purpose. Another use for aluminum naphthenate which has been suggested is as non-drying adhesive for special purposes.



A New Monocalcium Phosphate

By J. M. Gillet

Victor Chemical Works

THIS is a story of how the close co-operation between the food industry and the chemical industry brought about a program of chemical research that changed an old chemical into a new one, with a profound effect upon what the housewife can do with the number one food staple,—wheat flour.

We might continue from there and project the sociological effect upon unborn generations, of the light biscuits, tender cakes, succulent pancakes, and what not, resulting from this recent discovery. There is nothing more potent than a good breakfast to send the householder to work and the children to school with a cheerful outlook. Nor can anything more effectively quiet the irrascibility of these same worthies after a hard day than some light, hot biscuits at dinner. But CHEMICAL INDUSTRIES is celebrating the completion of 25 years of publishing the facts about chemicals and it probably does not desire to begin its second quarter-century with an excursion into the realm of the social sciences.

And so, to the business of phosphate.

Five times 25 years have passed since Berzelius first made monocalcium phosphate and recorded its properties. And 80 years have passed since monocalcium phosphate was initially introduced into food products to compete with the 6000 year old process of yeast-leavening for raising bread. During all the subsequent years there has been a gradual evolution of the compound from its early, comparatively crude state to the highly refined product of the past decade, and one would naturally expect the day of radical modification to be past. And yet the past 12 months have seen the introduction to the food industry of a monocalcium phosphate that is more conspicuously different from the 1938 standard than was the 1938 product from that of 1860.

This difference is not essentially a change in chemical analysis, for with the exception of the water of crystallization, the analysis of V-90, the new phosphate is identical with that of the predecessor phosphate of the past 10 years.

The real change in the product is a change in its behavior toward water and in the manner in which it reacts with soda in the leavening process. A description, therefore, of the mechanism of leavening bread by chemical reaction may not be out of place.

Leavening consists in generating within a raw, moist dough a multitude of tiny cells filled with carbon dioxide gas, which before the plasticity of the dough has been destroyed by the heat of the oven, will expand, "raising" or lightening the dough.

In chemical leavening, the gas is supplied by bicarbonate of soda. This gas is released from the soda by reaction with an acid-acting substance. The acid must be inactive toward the soda until liquid is added in the making up of the dough or batter; otherwise there would be a premature loss of gas. And in addition to supplying the raising power, chemical leavening materials, after liberating the gas, leave residual salts in the dough that modify the flour proteins and affect the texture, color, and tenderness of the baked products.

Monocalcium phosphate has been known as a fast-acting baking acid. It dissolved quickly when water or milk was added to the flour mixture in which it was contained; it almost instantly imparted a definitely acid character to the dough, giving the gluten the "short" inelastic properties characteristic of acid doughs; and it liberated the gas from the soda so rapidly that by the time the dough was thoroughly mixed and ready for the cutting out of the biscuits (not over two minutes) fully 60 per cent. of the gas had been liberated and dissipated.

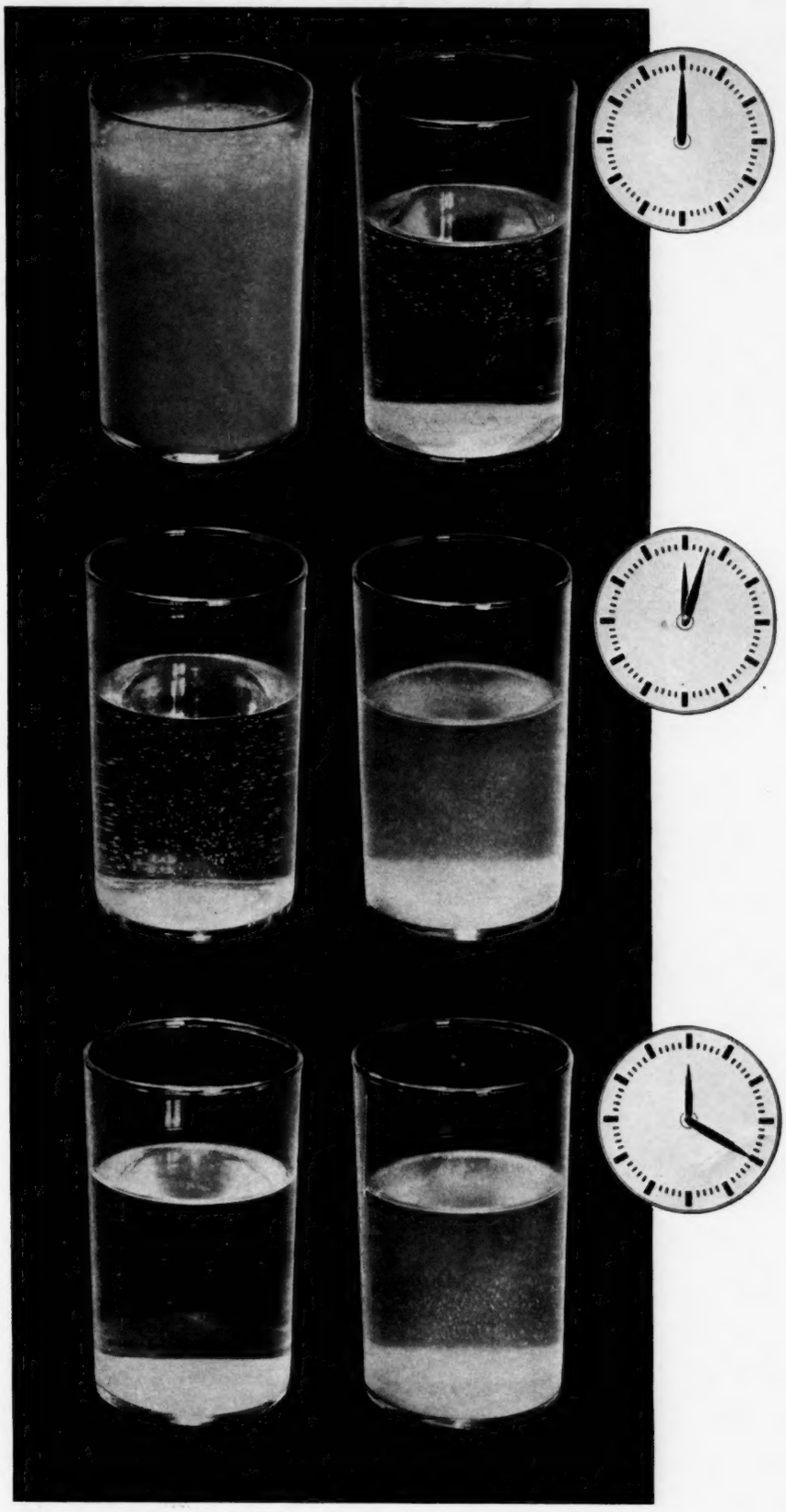
But in spite of the handicap of being too fast-acting for efficient leavening, monocalcium phosphate nevertheless produced oven products that excelled in flavor, color, and freshness. These advantages, together with the therapeutic values of phosphate made it the most extensively used of all leavening acids.

These were the properties of monocalcium phosphate—they always had been—and there seemed to be no reason to expect them to change. Yet in Victor's extensive researches, many things about phosphoric acid and its compounds had been observed that contradicted long experience, and it was with the definite objective of modifying, if possible, the less desirable characteristics of monocalcium phosphate that a research program was prosecuted, year after year.

The result of this research is a product called V-90, placed on the market just one year ago this month. Contained with soda in a dough or batter, V-90 does just those things that 80 years of leavening experience had shown monocalcium phosphate incapable of doing. First, when the liquid is added, nothing appears to happen. There is no sudden evolution of gas. The mixing proceeds, and at the end of two minutes, when the biscuits are all cut and ready for the oven, the gas is just beginning to be evolved. The result is that 85 per cent. of the gas is still available within the dough, where it can do useful work. In the meantime, the soda has dis-

solved ahead of the phosphate and has imparted alkaline characteristics to the dough, resulting in a soft, elastic gluten that can stretch as the tiny gas cells grow, forming a thin delicate network that supports the substance of the oven product.

Here are two glasses of cold water. To the first is added a teaspoonful of regular phosphate and a like amount of soda. To the second is added similar amounts of the new monocalcium phosphate and soda. The slowly soluble new phosphate is slow acting. Middle picture shows how regular phosphate mixture is largely spent, while the picture at the bottom shows how the new phosphate continues to evolve gas twenty minutes later.



By the time the biscuits are cut, the phosphate has just begun to dissolve, and as it does, evolution of gas starts—in a dough that can take the full expansion without tearing or blowing up.

The result is a biscuit having a specific volume of 3.00 as compared with 2.35 for the same flour leavened with the old type phosphate—a vastly lighter, more tender, more appetizing, and more digestible biscuit—or cake, or waffle, or pancake (it works in all of them), and more efficient utilization of the leavening gas because little or none is lost in the mixing.

Actually the increased efficiency has resulted in a reduction in the amount of phosphate and soda used per pound of flour, by 20 per cent.

The invention lies in the discovery that when crystals of monocalcium phosphate are formed by the reaction of lime and phosphoric acid, in the presence of traces of certain other phosphates, e.g. potassium, these traces are concentrated upon the surface of the crystals, and upon being mildly heated, they fuse to form an autogenous, relatively insoluble, and moisture resistant, skin-like coating. The monocalcium phosphate cannot dissolve until water has penetrated this coating and by control of the composition, heating, and mechanical conditions during formation of the coating, the rate of penetration of the water can be retarded as desired. The finished product is an anhydrous, slow acting phosphate. It is not necessary to start with an anhydrous crystal, since the heat treatment of the phosphate to fuse the coating would dehydrate the phosphate anyway. Victor nevertheless prefers to start with an anhydrous monocalcium phosphate in the form of small, well formed, solid crystals made by reacting lime with concentrated phosphoric acid at a temperature higher than that at which any monocalcium phosphate containing water of crystallization can exist.

Thus, by changing the temperature at which monocalcium phosphate is formed, and by careful adjustment of other constituents comprising an exceedingly small percentage of the product, and by controlled heating in a narrow range of temperature to fix the coating, an old chemical compound is made to exhibit the very characteristics which the food industry has desired for 80 years and had not until now been able to achieve.

The point of this story is that a combination of long acquaintance with phosphate, an intimate knowledge of baking problems, literally thousands of baking tests, and years of patient research, has been able to effect a revolutionary improvement in a chemical that was thought long since to have reached its highest state of development.

Peoria plant of Commercial Solvents Corporation

The Nitroparaffins and their Derivatives

By C. L. Gabriel

Commercial Solvents Corp.

"A new and dynamic branch of our industrial organic chemistry is being created"

NEW tools for the chemical industry will soon be available—not equipment or mechanical gadgets but new synthetic organic chemicals. Early in 1940, several saturated aliphatic nitrohydrocarbons and a number of their derivatives will be available to industry for the first time on a large commercial scale.

Eight years ago Professor Henry B. Hass of Purdue University began to work in the laboratory on the direct nitration of paraffin hydrocarbons. By 1935 the experimental work had reached the stage where fair conversions and yields were being obtained. The research was brought to the attention of the Commercial Solvents Corporation and in view of the many possible uses for the nitroparaffins, especially as raw materials from which numerous organic chemicals could be made, the corporation arranged with the Purdue Research Foundation for an exclusive license under various patents and applications relating to the processes. Research work on the process was moved from Purdue to the corporation's laboratories at Terre Haute, Indiana, although through fellowships laboratory development of some experimental phases, especially the preparation of derivatives, was continued at the University. Intensive work was done at Terre Haute on the nitration process itself, with the result that a little over two years ago a semi-commercial unit was installed for the direct nitration in the vapor phase of the paraffin hydrocarbons. The problems which had to be solved are quite apparent when consideration is given to the corrosive nature of the intermediate products formed, and the fact that 100% conversions are not attained in a single pass through the equipment. In other words, there is obtained from the nitration unit a mixture containing nitroparaffins, unreacted saturated paraffin hydrocarbons, olefins, various oxides of nitrogen, oxidation products of the hydrocarbons, and water. These must be separated not only to obtain the nitroparaffins in pure form but also to put the paraffins and various nitrogen oxides in such condition that they are satisfactory for re-use in the nitration equipment. The erection of a large commercial unit indicates that the various problems have been solved.

When the paraffins are nitrated, nitroparaffins having the same number of carbon atoms are formed, together with

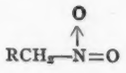
other nitroparaffins having a shorter carbon chain than that of the original paraffin. Of course, methane is the exception, for when methane is nitrated the only nitroparaffin which can be formed is nitromethane. When ethane is nitrated, both nitroethane and nitromethane are produced. Propane is the lowest member of the paraffin series which on nitration yields both a 1- and a 2-nitro compound. Thus, when propane is nitrated, there are formed 1-nitropropane, 2-nitropropane, nitroethane and nitromethane.

Although both higher and lower saturated aliphatic hydrocarbons have been nitrated, it is planned to start large scale production on propane, thus making four nitroparaffins commercially available.

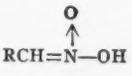
While the nitroparaffins are excellent solvents, their greatest industrial importance may be as raw materials for organic chemical synthesis. The importance of nitrated cyclic hydrocarbons such as nitrobenzol and nitrotoluol is well known. These products are the bases from which numerous aniline dyestuffs and pharmaceuticals are being made. About five hundred derivatives of the nitroparaffins have so far been synthesized, and these represent but a small proportion of the total possibilities. However, in starting a new chemical industry of such great possibilities it is evident that the number of products initially made must be limited. As a result of a fairly comprehensive market survey a plant is being installed which will also produce such products as nitroalcohols, nitroglycols, a nitrotriol, aminoalcohols, aminoglycols, and an aminotriol, also hydroxylammonium sulfate and hydroxylammonium acid sulfate.

Chemistry of the Nitroparaffins and Their Derivatives

The normal structure of a primary nitroparaffin is:

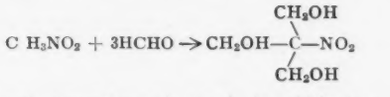


However, in the presence of water this structure changes to a form generally known as a pseudo or nitronic acid, having the following structure:

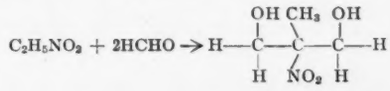


By means of a strong base the pseudo acid can be neutralized. Thus with caustic soda a sodium salt is formed by replacement of the hydrogen in the hydroxyl group with sodium. As carbon dioxide is more acidic than the nitroparaffins, saturation of a sodium salt of the nitroparaffins with CO_2 will regenerate the nitroparaffins and form sodium carbonate. Conversely, a sodium carbonate solution will not dissolve a nitroparaffin to form a salt.

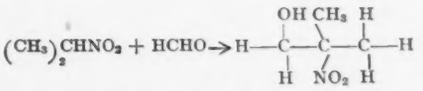
Just as nitrobenzol can be reduced to aniline so the nitroparaffins can be reduced to the corresponding monoalkylamines. The nitroparaffins react with aldehydes in the presence of basic catalysts to form nitrohydroxy compounds having one, two or three hydroxyl groups, depending on the proportions and particular nitroparaffin used. It is quite evident that by using different nitroparaffins in combination with different aldehydes a very large number of nitrohydroxy compounds can be produced. The following examples are illustrative of this reaction:



1 mol nitromethane + 3 mols formaldehyde = 1 mol tris (hydroxymethyl) nitromethane.



1 mol nitroethane + 2 mols formaldehyde = 1 mol 2-nitro-2-methyl-1,3-propanediol.

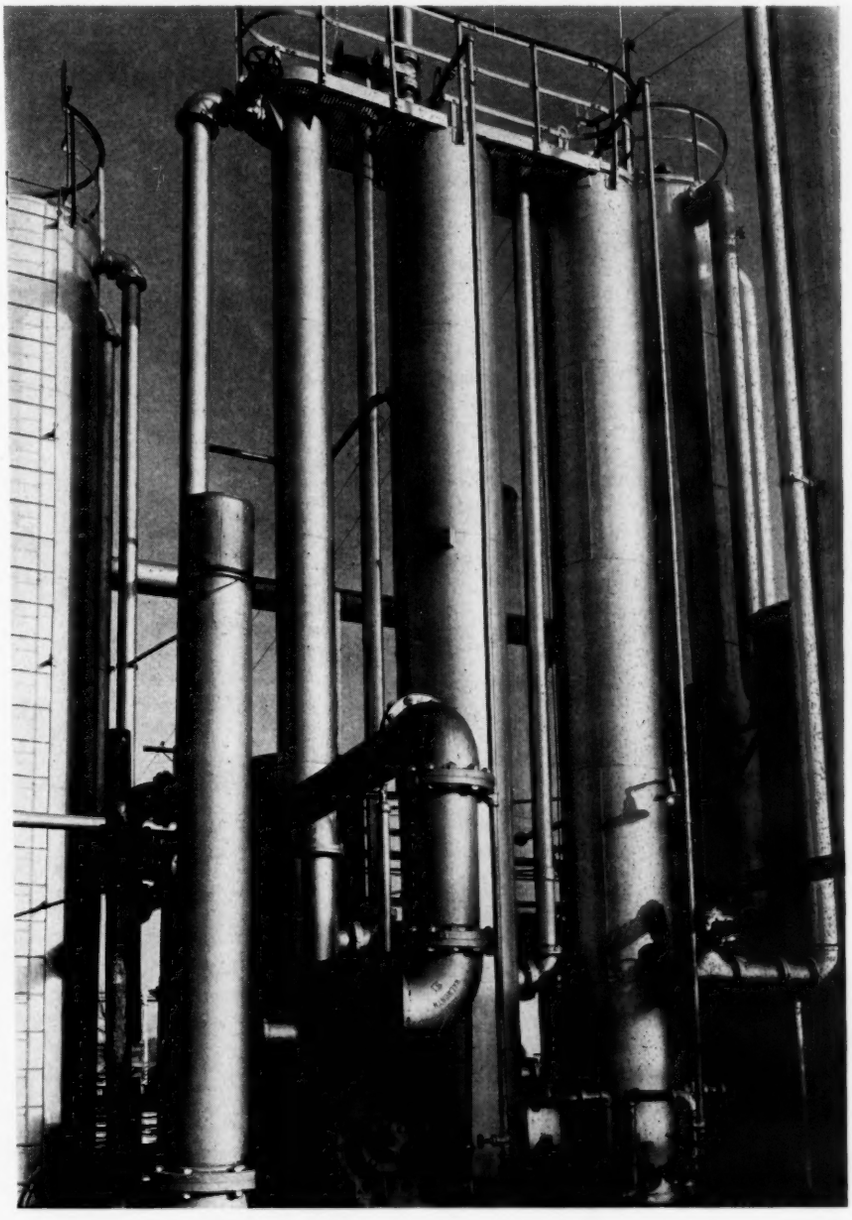


1 mol 2-nitropropane + 1 mol formaldehyde = 1 mol 2-nitro-2-methyl-1-propanol.

In these nitrohydroxy compounds the hydroxyl groups and nitro groups are on adjoining carbon atoms. The nitroparaffins react with aromatic as well as aliphatic aldehydes.

In their chemical reaction the nitrohydroxy compounds may be compared to alcohols or the nitrohydrocarbons. Like the former they can be esterified by the usual methods to form esters such as acetates, phthalates and phosphates, whose plasticizing properties are worthy of investigation. The trinitrate of tris(hydroxymethyl)nitromethane, known as nitroisobutyl glycerine trinitrate, is an

Scrubbers and absorbers.



excellent explosive similar to nitroglycerine, but said to be somewhat more stable and to have a lower freezing point.

Like the nitrohydrocarbons the nitrohydroxy compounds are slightly acid in aqueous solution. They can be reduced to the corresponding aminohydroxy compounds and can be chlorinated to form such products as chloronitroalcohols, chloronitroglycols and similar materials.

Chemically, the aminohydroxy compounds are very interesting materials, combining the chemical properties of amines with those of alcohols, glycols and glycerol. They are basic in aqueous solution and while their alkalinity approaches that of ammonia, some are slightly less basic than this material while others are more alkaline. The reactions of the aminoglycols and aminotriol to form resins should be of definite industrial interest, for these compounds may be used in place of glycols or glycerol to react with dicarboxylic acids, or in place of urea to react with aldehydes.

The aminohydroxy compounds, like other amines, combine with acids to form salts. When a fatty acid such as oleic or stearic is used a soap is formed which is practically neutral, having a pH from about 8.0 to 9.0 in the range from 10% excess acid to 10% excess base. From the quantity of acid or base required to change the pH, the soaps of these aminohydroxy compounds appear to have considerable buffering action.

Esters of aminohydroxy compounds can be made. In aqueous solutions aminohydroxy compounds absorb carbon dioxide and other acidic gases and liberate them on heating.

The nitroparaffins can be halogenated to form mono- or poly-halogen derivatives. These include such products as 1-chloro-1-nitroethane, 1,1-dichloro-1-nitroethane, 1-chloro-1-nitropropane, 2-chloro-2-nitropropane and 1,1-dichloro-1-nitropropane. Chloropicrin (CCl_3NO_2) is made in good yields by directly chlorinating nitromethane in the presence of calcium carbonate (U. S. Patent 1,996,388).

When primary nitroparaffins are treated with strong mineral acids there are formed fatty acids having the same number of carbon atoms as has the nitroparaffin treated, and in addition the hydroxylammonium salt of the mineral acid used. Thus, if nitroethane is reacted with a strong sulfuric acid-water mixture, the products obtained are acetic acid and hydroxylammonium acid sulfate. If it is attempted to carry out the reaction in the absence of water a hydroxamic acid which has the same number of carbon atoms as the nitroparaffin used is made. Thus nitroethane in the presence of an anhydrous mineral acid would give acetohydroxamic acid. The above reactions are cited merely as examples and are by no means intended to cover the possibilities. No mention has been made of such reactions as substitutions for chlorine in chloronitroparaffins and chloronitrohydroxy compounds, reactions between nitroparaffins and cyclic aldehydes, condensation to form dinitro derivatives and many other syntheses which are readily apparent to the organic chemist.

Physical Properties of the Nitroparaffins and Some of Their Derivatives

As nitromethane, the lowest member of the nitroparaffin series, boils at 101° C., and as 1-nitropropane, the highest boiling member of those which will shortly be commercially available, distills at 132° C., these products may be described as liquids of medium boiling range. As might be expected, the boiling points increase and the specific gravity and water solubility decrease with increase in the number of carbon atoms. These nitroparaffins are colorless, have relatively high flash points and sufficient stability so that they can be distilled without decomposition at atmospheric pressure. When mixed with air the lower limits of flammability of the nitroparaffins are 8% for nitromethane, 4% for nitroethane and 2.5% for the nitropropanes. Although the salts of the nitroparaffins, especially the alkali salts, are said to be explosive in a dry state, the nitroparaffins themselves are apparently free from explosion hazards. Experiments indicate that nitromethane is the only one which can be detonated, and in order to bring this about the nitromethane must be in a closed container and detonated under special conditions. Some of the physical constants of pure nitroparaffins containing up to three carbon atoms are shown in Table 1.

Table 1

	Nitromethane	Nitroethane	1-Nitropropane	2-Nitropropane
Formula	CH_3NO_2	$CH_3CH_2NO_2$	$CH_3CH_2CH_2NO_2$	$CH_3CHNO_2CH_3$
Molecular Weight	61	75	89	89
Boiling Point	101° C.	114° C.	132° C.	120° C.
Freezing Point	-29° C.	-90° C.	-108° C.	-93° C.
Flash Point (Tagliabue Open Cup)	95° F.	82° F.	93° F.	75° F.
Index of Refraction—20° C.	1.3818	1.3916	1.4015	1.3941
Specific Gravity—20/20° C.	1.139	1.052	1.003	0.992
Wt. per U. S. Gallon	9.5 lbs.	8.8 lbs.	8.4 lbs.	8.3 lbs.
Color	Water white	Water white	Water white	Water white
Odor	Mild	Mild	Mild	Mild
Solubility in 100 cc. water	9-10 cc.	4.5 cc.	1.4 cc.	1.7 cc.
Solubility of water in 100 cc. of nitroparaffin	2.2 cc.	0.9 cc.	0.5 cc.	0.6 cc.
Vapor Pressure at 20° C. in mm. of mercury	27.8	15.5	7.5	12.9
pH 0.01 M. aqueous solutions	6.12	5.20	5.61	5.33
pH water saturated with nitroparaffin	4.01	3.85	4.33	4.29
pH nitroparaffin saturated with water	4.82	3.75	4.06	3.00
Surface tension at 20° C. in dynes per cm.	37	31	30	...
Evaporation Rate (Butanol=1)	4	3	2	2.5

The nitroalcohols are heavy liquids, the nitroglycols and nitrotriol are white crystalline solids. The nitroalcohols are soluble in the usual oxygenated organic solvents and in the aromatic hydrocarbons. Those containing less than six carbon atoms are only slightly soluble in petroleum solvents but are quite soluble in water.

The nitroglycols are all soluble in water and insoluble in petroleum hydrocarbons. Most of these products are soluble in the usual oxygenated organic solvents, although 2-nitro-2-methyl-1,3-propanediol is not. Tris(hydroxymethyl)nitromethane, the nitrotriol, is extremely soluble in water. Many nitrohydroxy compounds have been synthesized. Some of the more important constants of these products made by highly purifying those about to become commercially available are given in Table 2.

The aminoglycols and the lower aminoalcohols are soluble in water and in alcohols but insoluble in petroleum solvents. Some of the aminoalcohols are liquid while others are solids at room temperature. The aminoglycols and the aminotriol are all pure white crystalline solids.

As would, of course, be expected, the aminohydroxy compounds each have an alkaline pH. While the aminoalcohols

Table 2

	2-Nitro-1-Butanol	2-Nitro-2-Methyl-1-Propanol	2-Nitro-2-Methyl-1,3-Propanediol	2-Nitro-2-Ethyl-1,3-Propanediol	Tris (hydroxymethyl) nitromethane
Formula	$CH_3CH_2\underset{\displaystyle NO_2}{\underset{\vert}{C}}HCH_2OH$	$CH_3\underset{\displaystyle NO_2}{\underset{\vert}{C}}(CH_3)CH_2OH$	$CH_2OH\underset{\displaystyle NO_2}{\underset{\vert}{C}}(CH_3)CH_2OH$	$CH_2OH\underset{\displaystyle NO_2}{\underset{\vert}{C}}(C_2H_5)CH_2OH$	$NO_2C(CH_2OH)_3$
Molecular weight	119	119	135	149	151
Melting point	—47/48° C.	90-95.5° C.	147-9° C.	56-57°C.	165-170° C.
Boiling point at 10 mm.	105° C	94.5-95.5° C.	Decomposes	Decomposes	Decomposes
pH 0.1 M aqueous solution	4.51	5.12	5.42	5.48	5.61
Solubility in 100 cc. water—20° C.	20 g.	350 g.	80 g.	400 g.	220 g.

have extremely low vapor pressure at room temperature, the aminoglycols and the aminotriol are practically non-volatile.

Some of the physical constants of the pure aminohydroxy compounds derived from the nitrohydroxy products previously referred to are given in Table 3.

Table 3

	2-Amino-1-Butanol	2-Amino-2-Methyl-1-Propanol	2-Amino-2-Methyl-1,3 Propanediol	2-Amino-2-Ethyl-1,3-Propanediol	Tris (hydroxymethyl) aminomethane
Formula	$CH_3CH_2CH(NH_2)CH_2OH$	$CH_3C(NH_2)(CH_3)CH_2OH$	$CH_2OHC(NH_2)(CH_3)CH_2OH$	$CH_2OHC(NH_2)(C_2H_5)CH_2OH$	$NH_2C(CH_2OH)_3$
Molecular weight	89	89	105	119	121
Melting point	-2° C.	25-26° C.	109-111° C.	37.5-38.5° C.	170.5-171.5° C.
Boiling point	178° C. 79-80 @ 10 mm.	165° C. 67.4 @ 10 mm.	151-2° C. (10 mm.)	152-3° C. (10 mm.)	219-220° C. (10 mm.)
Specific gravity	0.944	0.934	...	1.099	...
pH at 20° C. 0.1 M solutions	11.11	11.27	10.78	10.82	10.36
Solubility in 100 cc. water	Completely miscible	Completely miscible	250 g.	Completely miscible	80 g.
Vapor Pressure at 20° C (est.)	0.5 mm.	1 mm.	...	...	...
Flash point Tagliabue open cup	164° F.	153° F.	...	166° F.	...
Index of refraction—20° C.	1.453	1.449	...	1.490	...

Hydroxylamine

Hydroxylamine, unlike the other nitroparaffin derivatives, has been known for a great many years. A study of the technical and patent literature will indicate that this compound is extremely reactive and may be used in many organic syntheses. However, hydroxylamine has heretofore only been available at a high price and for this reason its commercial applications have been extremely limited. The manufacture of hydroxylammonium salts through the acid hydrolysis of a primary nitroparaffin changes this situation. The cheapest form in which hydroxylamine will be available will be a crude acid sulfate. The approximate analyses of this and other forms of hydroxylammonium sulfates are shown in the tabulation below:

Table 4

	Hydroxylammonium Acid Sulfate	Hydroxylammonium Sulfate—Tech.	Hydroxylammonium Sulfate—Refined
Formula	$NH_2OH.H_2SO_4$	$(NH_2OH)_2.H_2SO_4$	$(NH_2OH)_2.H_2SO_4$
Hydroxylammonium salt content	80%	90%	99.5%
Ammonium sulfate	10%	10%	...
Free sulfuric acid	9%	....	...
Organic acid	1%	....	...

The salts are relatively stable hygroscopic solids.

Hydroxylamine itself is a colorless crystalline basic derivative of ammonia which melts at 33° C. It may be regarded as ammonia in which one hydrogen is replaced by a hydroxyl group. It decomposes with explosive violence if heated to about 100° C. With acids it forms definite salts without the elimination of water. Hydroxylamine is readily soluble in water and to a lesser extent in the lower alcohols. Its aqueous solution has a strong alkaline reaction and with salts of zinc, nickel, iron, aluminum and chromium it forms precipitates insoluble in excess hydroxylamine. Under some conditions it is a reducing agent while under others it can be used as an oxidizing agent, being itself reduced to ammonia.

Hydroxylamine reacts with aldehydes and ketones to form respectively aldoximes and ketoximes, which can be reduced to the corresponding amino compounds, by which means higher amines can be synthesized. Oxamic acids are formed from hydroxylamine and the esters of organic acids. The reaction between hydroxylamine and sulfur dioxide produces sulfamic acid. Aniline and naphthylamine as well as other arylamines are oxidized by hydroxylammonium hydrochloride to induline, while free hydroxylamine will reduce quinone to hydroquinone.

Owing to the instability of free hydroxylamine a stable salt such as the sulfate is used as a source of the base in most reactions involving the product. In view of the availability of the product at reasonable prices there is no question that many chemical manufacturers will review prior work on the use of hydroxylamine to see if old developments can now be commercially utilized.

Uses of the Nitroparaffins

The nitroparaffins are solvents for nitrocellulose, the vinylites, the alkyds and for many other resins; also for oils, fats, waxes, and many organic chemicals. The lower members of the series are miscible with most of the aromatic and lower aliphatic hydrocarbons, alcohols, esters, ketones and acids. When a nitroparaffin is mixed with an alcohol it becomes an excellent solvent for cellulose acetate and for mixed cellulose esters such as the acetopropionate and acetobutyrate, thus making available for the first time a series of medium boiling solvents for cellulose acetate by which the rate of evaporation of the solvent mixture can be controlled. The difficultly soluble cellulose triacetate can be dissolved in a nitromethane-methanol mixture.

The nitroparaffins give solutions of vinylites having considerably lower viscosities than those obtained when ketones are used as the solvents.

Nitroethane is a heat sensitizer for rubber latex. The patent literature mentions the use of the nitroparaffins in the refining of mineral oils and as anti-knock agents in diesel fuels.

Uses of the Derivatives of the Nitroparaffins

The nitrohydroxy compounds dissolve cellulose acetate. The lower molecular weight liquid nitroalcohols are excellent solvents for zein and gliadin. It has been definitely shown that 2-nitro-2-methyl-1-propanol is an excellent heat sensitizer for rubber latex, giving sensitized dispersions which are stable for a week or more at temperatures as high as 80° F. The gelling of latex solutions is greatly accelerated by heating in the presence of this nitroalcohol. Esters of the nitrohydroxy compounds such as methyl 2-methyl-2-nitropropyl phthalate are excellent plasticizers for cellulose acetate, yielding molded objects having hard surfaces and good water resistance.

On nitrating the nitrotriol, tris(hydroxymethyl)nitromethane, an explosive of great similarity to nitroglycerine is produced.

Oleate and Stearate Soaps

The oleate and stearate soaps of the aminohydroxy compounds due to their solubility in both water and oils are excellent emulsifying agents for oils, fats, waxes and similar materials. Thus they are useful in cosmetics, textiles and leather specialties, wax polishes and coating materials. The soaps are relatively stable and practically odorless. They reduce the surface tension of water to a great extent, as is indicated in Table 5.

As was previously stated, the aminohydroxy compounds can be used for the purification of such acidic gases as carbon

Table 5

	Surface Tensions in dynes per centimeter at following concentrations: 5%	1%	0.5%
Oleate of 2-Amino-2-Methyl-1-Propanol	29.2	27.7	27.8
Oleate of 2-Amino-2-Methyl-1,3-Propanediol	28.4	28.4	27.5
Oleate of Tris (hydroxymethyl) aminomethane	26.4	26.9	27.2

dioxide due to their property of absorbing such gases in the cold and again liberating them when the aqueous solution is heated.

As nitro and aminohydroxy compounds, especially the diols and triols can be considered to be modified glycols and glycerine-like materials, they have been used experimentally for the production of modified resins of the glyptal type. The aminohydroxy compounds are also of interest in chemical synthesis as both the amine and hydroxyl groups participate in various characteristic reactions.

The nitroparaffins and nitroalcohols can be halogenated to form such products as chloronitroparaffins, chloronitroalcohols and chloronitroglycols. Reactions involving replacement of the chlorine group will be recognized by any chemist. From nitromethane, chloropicrin, a useful fumigant and war gas, is easily produced. 1-Chloro-1-nitropropane is an excellent anti-gelling agent for heat vulcanizing rubber cements. Chloronitroparaffins appear to have uses as fumigants and insect repellents. The use of the chloronitroparaffins as selective solvents for use in refining of lubricating oils is mentioned in patents.

Uses of Hydroxylamine

Many references to the utilization of hydroxylamine are to be found in the technical and patent literature. In addition to being a raw material for use in synthesizing dyestuffs, pharmaceuticals and other organic chemicals, and for purifying aldehydes and ketones, hydroxylamine is a photographic developer and an effective dehairing agent. Its use as an oxidation inhibitor for lubricating oils has been suggested. Hydroxylamine is said to be a powerful antiseptic which does not discolor the skin.

Conclusion

As the nitroparaffins are made from relatively cheap raw materials they should be available at reasonable prices when produced in large volume. Low cost products having physical and chemical properties such as those set forth in this article are bound to find additional extensive outlets and to be extremely helpful in fostering new developments in the chemical and chemical-consuming industries. In view of the almost innumerable derivatives which can be made, synthetic development based on the nitroparaffins will be conducted for many years to come. A new and dynamic branch of industrial organic chemistry is being created.

New Chemicals

A series of industrial detergents is offered by a manufacturer of chemical specialties. These cleansers are claimed to be particularly effective in cleaning metal surfaces that are to be electroplated or painted. They are said to be soluble in cold water, and to have no corrosive action, acid or alkaline, upon the metal surfaces, although capable of dissolving completely grit, carbonized or gummy deposits of petroleum lubricants, and other hydrocarbon materials; rinsing completely in water, they leave a chemically clean surface. Three distinct grades of cleaning compound are available; for iron or steel, for aluminum and tin or their alloys, and for non-ferrous metals and alloys.

Synthetic Resin Base

Product is the sodium salt of a polymerized resin acid in aqueous solution. Although readily miscible with inorganic solutions of acids, alkalies, and salts, it is claimed that the resin is immiscible with organic solvents. Its aqueous solution is stable both to acid and alkali, the latter increasing the viscosity appreciably. The resin base forms soluble salts with the alkali metals and with ammonia; its barium, aluminum, and zinc salts are quite insoluble. This new synthetic is said to form stable films when deposited from solution. In solution or suspension, it is claimed to be unique as an emulsifying and penetrating dispersant; in small amounts, it can be made to serve as a protective colloid to stabilize a wide range of dispersions. These colloidal properties are said to be little affected by the acidity or alkalinity of the solvent.

Talloil Fatty Acid Substitutes

Now available in commercial quantities are 2 synthetic fatty acids which, it is said, can be used either wholly or partially in place of other, more expensive, fats or fatty acids in a wide range of industrial applications. These fatty bases are suggested as substitutes for such materials as animal red oil, corn oil, olive oil, and commonly available refined talloils, in the manufacture of various sulfonated oils, esters, and liquid soaps.

Lubricating Assistant

Known as "Motor Mica," this compound is added to petroleum oils and to cutting oils to materially improve their viscosity characteristics. It is claimed that only a small proportion of the product is required to make deep-drawing and other machine cutting operations easier and more productive of clean draws and finishes. In addition, "Motor Mica" is claimed to reduce the amount of lubricant ordinarily required in these operations.

"Firmex"

Compound is a synthetic plastic sealing and caulking compound, said to be waterproof and resistant to all weather conditions. It is recommended as a general bonding and sealing material in general construction and maintenance, and is available in specially colored grades for setting plumbing fixtures. Among other applications, it may be used safely as a bond for setting tile—eliminating entirely the use of mortar—and for sealing watertight ships, aquaria, and greenhouses.

"Mertanol"

This material was developed to provide tanners with a product especially suited to the bleaching of chrome-tanned skins, preparatory to making whites, as well as to improving vegetable tanning generally. Compound is an acid-reacting liquid, colorless, containing a small amount of sodium sulfate, and belongs to the class of synthetic tanning assistants known as "syntans." Manufacturer claims that this agent has been used successfully in treating cow, calf, sheep, and kid in amounts of 5-15% on the wet skin weights and following a variety of curing methods.

Textile Kier Assistant

A well-known manufacturer has just placed on the market a textile desizing agent that is said to maintain a mild oxidizing action in caustic alkaline solutions, yet has no tendering effect on cotton nor corrosive action upon the vessel. The amount of reagent necessary is only 0.1-0.2% of the weight of goods to be treated. New compound is said to be a valuable assistant in preparing textiles for subsequent bleaching and dyeing, making for better and more permanent final white or dyed goods.

"Somite"

The manufacture of a new acetyl cellulose plastic ("Somite"), claimed to be an ideal substitute for metallic materials, will soon be undertaken on an industrial basis in Japan, according to a report from the assistant commercial attache at Tokyo, U. S. Dept of Commerce. Material is said to be derived from waste fiber treated by the viscose process, and is said to combine the plasticity of synthetic resin, the ductility of celluloid, and the strength of vulcanized fiber. Product is now being used in making conduit tubes, hinges, door handles, and similar light hardware. It is said to be insoluble at high temperatures and little affected by acetone, benzine, oil and other hydro-phobes.

Skin-Protecting Cream

Safety engineers are said to be conducting successful tests on a unique antiseptic cream which forms a thin, tough protective film over skin surfaces. This film is claimed to shut out infection, and to protect workmen against skin infections due to cement burns, paint fume absorption, and other sources of dermatoses. It is said that oil field and refinery workers, and employees in the gas, explosives, and fertilizer trades have been benefited through the use of this protective cream.

Recent Developments in Laboratory Apparatus

WILLIAM B. WARREN, Director of Development, and Howard Draving, Advertising Manager, Fisher Scientific Co., Pittsburgh, Pa., *first vividly contrast the situation of the laboratory worker today with his limitations in equipment twenty-five years ago and then indicate many of the new developments in laboratory apparatus, particularly in the past two years, that permit more accurate work.*

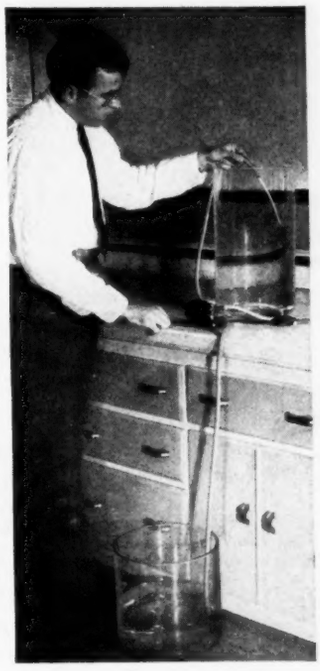
A new safety pipette filler completely eliminates the danger of getting harmful liquids in the mouth.

WE find ourselves in the midst of stirring times, and it is interesting to compare the situation of the laboratory worker today with his situation during similar circumstances 25 years ago. The sudden cutting off of foreign sources of laboratory apparatus and chemicals in 1914 was a severe blow to the laboratory worker of that day for there were few domestic sources of the materials with which he worked. For a time he was very much hampered in the pursuit of his work, and it was not until the passage of several years that an American apparatus industry had developed to the point where it could begin to fulfill his requirements. Since that time there has developed an American apparatus industry which is second to none, and the laboratory worker of today has no difficulty in obtaining anything which may be needed for the conduct of his work. American glasses, porcelains, reagents and apparatus are all available, and in quality which is equal or better than any obtainable elsewhere.

That this industry is very much alive to the needs of the chemist is indicated by a survey of some of the new and interesting equipment which it has made available during the past few years.

pH Meters Important for Control

The determination of hydrogen ion concentration is of particular importance in both plant and laboratory, and electrical methods have been adopted in several forms. One of the first electrical pH meters was that of Beckman. This is a vacuum tube voltmeter which measures the potential between a pair of electrodes immersed in the solution being examined. The method is based on sound electrical and electrochemical theory and is generally employed with the glass-calomel electrode pair, the direct relationship between pH and electrode pair potential being employed in the pH determination. The Beckman instrument is available in two models, one for laboratory use, and the other for plant use, and a large number of accessories are available.



A midget pump creates a flow of liquid in many kinds of laboratory set-ups.

Other pH meters employing methods which are in general similar to the Beckman are those of Thwing-Albert, Coleman, and Leeds & Northrup. The Cameron, Beckman, and Coleman are also available in a recording and controlling model.

Meters of the vacuum tube voltmeter type are generally precise to ± 0.02 units. Where preliminary or rough determinations of ± 1 pH unit are to be made, there is now available a group of so-called universal indicators, among which are "Alkacid' and "Hydrion." More precise measurements of pH can be made with the LaMotte Comparator, although in each case the pH range that can be covered at one time is limited.

The measurement of the electrical conductivity of solutions for the purpose of determining the concentration of dissolved salts has become increasingly important, and recently there have appeared new instruments for this purpose.

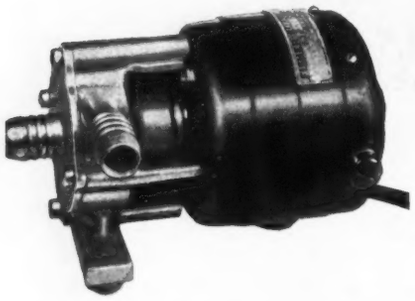
Light Absorption Measurement

Chemical analysis through measurement of the absorption of light by the solution has long been practiced, and until recently, such work has been conducted by the so-called visual method. More accurate measurement, free from the human element, may be obtained by the use of the photoelectric cell and associated electric equipment. The development of this type of equipment in the last several years has widened the field of application of colorimetric analysis, and provided a degree of accuracy more comparable with those attained on gravimetric and volumetric analyses. The inherent limitations of the human eye have been recognized and the

substitution of electrical devices has been widely accepted because of their superior accuracy.

New photoelectric photometers of this class are the Evelyn, the Fisher Electrophotometer, Klett-Summerson, K.Y.W.Z., Photoelectric Photometer, and the "Photelometer." The Electrophotometer provides the means of making colorimetric analyses by exact electrical measurements instead of inexact visual comparisons. It can be employed for the quantitative analysis of any liquid where the color intensity of the liquid varies with the concentration of the unknown constituent.

All the instruments mentioned are especially adapted for measurement of light absorption of solutions, and in many cases can be used to measure turbidity.



The midget circulating pump resists dilute acids and other corrosive liquids.

Two photoelectric instruments especially designed for turbidity measurements are the Parr Turbidimeter, and the Ess Color Comparator and Turbidimeter.

An instrument for the measurement of reflected light is the Lange Photoelectric Reflectometer, and there has recently been made available the Photo-Electric Fluorophotometer, for measuring the fluorescence of liquids. Such measurements are of particular importance in the field of biochemistry.

The Coleman Regional Spectrophotometer is an instrument with which the sample may be examined for light transmission at any wavelength within the visible range. It employs a photocell for light measurement and the output of the photocell is measured with a Coleman pH meter.

Instruments for spectroscopic measurements have received considerable attention from development engineers, and improved models are available from Bausch & Lomb, Harry W. Dietert, and Carl Zeiss.

One system for colorimetric analysis which involves comparison of deep layers of solution with equal depths of standard colored solutions of known characteristics is that which uses the Nessler Tube. An apparatus which considerably facilitates this procedure is the Fisher Nesslerimeter, available in two models for short and long tubes.

All photometric work involving the use of solutions requires carefully made glass cells for containing the solutions, and a fuzed optical cell is now being made in this country.

Titration Apparatus Valuable

Electrometric titration has become a very valuable asset to the chemist, and many determinations can be conducted by these means which are impossible by ordinary ones; particularly where dark colored solutions obscure the end-point changes of the usual colored indicators. An instrument with which it is possible to conduct acid-base, oxidation-reduction, precipitation and conductivity titrations by the electrometric technique is the Fisher Titrimeter. Glass-calomel, monometallic and bimetallic electrode systems can be employed, and it comes as a complete titration apparatus with burette and sample container holder, as well as an electrical stirring system.

It may be a surprise to many to know that it is even possible to determine the carbon content of steel by electrical means. A new instrument for this purpose is the Fisher Carbanalyzer. It is portable and can be taken to and used right at the open hearth furnace. A sample of steel is cast according to a standard procedure and when cool, it is placed in the instrument where measurements of its magnetic properties enables the determination of its carbon content. The whole analysis is made in a fraction of the time required for a chemical analysis for carbon.

The dropping mercury electrode as an analytical tool has been known for some years, but has only recently come into prominence in this country. This again is an electrical tool for the chemist, and with it he can conduct a large number of analyses. It is noteworthy for the facts that as many as 6 ions may be detected in the same solution at the same time, and also because it works best at ionic concentration between 10^{-2} and 10^{-6} equivalents per liter. Equipment for conducting chemical analyses with the dropping mercury are the Fisher Electropode, the Electrochemograph, and the Micropolarograph.

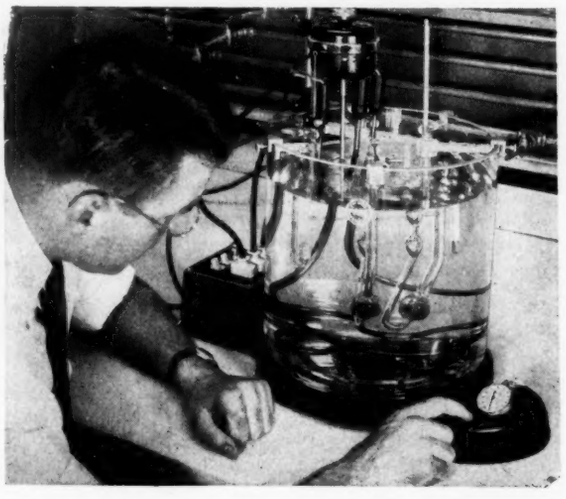
Electric lamp manufacturers have been particularly active in development of new forms, and two of them have significance in the chemical field. Ultra-violet light produced by the Sterilamp of Westinghouse, and the Germicidal lamp of General Electric may be used to sterilize gases and certain surfaces. A close approach to the elusive "cold light" of the firefly is to be had from the fluorescent lamps made available by these same two sources, and such lamps have been built into a form practical for general laboratory use.

Polaroid Useful Material

Polarized light is useful in many ways in the laboratory, and has generally been produced through the medium of Nichol prisms. Such prisms are quite expensive, and it has never been economical to produce a beam of polarized light of any considerable area until the advent of Polaroid. Polaroid is a plastic material onto or into which certain crystalline materials are assembled in such manner that a beam of light passing through it is polarized. A second sheet of the same material may be used as an analyzer.

This material is available in sheets and with it it is possible to polarize a beam of considerable cross-sectional area at a reasonable cost. Instruments employing Polaroid are the Polaroid Glass Inspection Polariscope and several similar Polaroid strain detectors, as well as Polarizing microscope attachments.

A centrifuge is of considerable interest to the laboratory worker and has received a great deal of attention from several manufacturers. Small motor-driven, streamlined centrifuges have been brought out, and there is a new sturdy, hand-operated centrifuge, which is a big improvement over those formerly imported from Europe.



One of the new appliances for use in making these viscosity measurements is the Modified Ostwald Viscosity Pipette developed by Dr. M. R. Fenske and Dr. M. R. Cannon at Penn State. It was reported and subsequently adopted as a tentative standard (D-445-38T) by the A. S. T. M. for use in determining the kinematic viscosity of any petroleum product or lubricant which is a true viscous liquid at the temperature of the test.

New accessories for use with the centrifuge are Pyrex Centrifuge Tubes, Lusteroid Unbreakable Centrifuge Tubes, and a very useful speedometer for the International centrifuge.

Contributions to Safety

Safety in the laboratory gained the attention of several manufacturers, to the advantage of the health and safety of the individual worker. One of these is a transparent visor-type eye shield to be worn for the protection of the eyes and upper part of the face. It can be worn over spectacles and can be lifted over the forehead when desired.

A new article, a fire blanket, is a wise precaution in any laboratory where inflammable materials may endanger the worker. It is an all-wool, fire-proof blanket which folds into a case, occupies little space and is readily pulled out by the stricken person.

Two devices can now be had to eliminate the danger of drawing up dangerous liquids into pipettes with the mouth. The Fisher Safety Pipette Filler, which is made of aluminum, has a piston that pulls up about 3 ml. per stroke, and an ingenious valve that closes on the upstroke and releases on the downstroke. With a little practice, the user can draw up liquid just as he would with his mouth, and allow it to drain by gravity just as he would with his finger. The other, the Caulfield Safety Device, has a rubber bulb over a valve, which has a valve control at the top.

These safety devices, added to a long list of equipment already available, undoubtedly have resulted in a decrease in the number of injuries, and accidents resulting from laboratory work. However, accidents still occur and almost every laboratory has first aid materials ready for emergencies. Fisher Scientific Company recently compiled and distributed, without charge, a Laboratory Emergency Chart as a contribution to safety in the laboratory, and also has offered a First Aid Cabinet, especially planned to contain the particular materials for treating accidents peculiar to chemical laboratory work. The chart lists specific antidotes for 54 different poisons and suggests preliminary treatment for burns and scalds, cuts, collapse, toxic headaches, electrical shock, and gives illustrated instructions for artificial resuscitation.

New Supports Listed

The Fisher Castaloy line of clamps, holders and supports has been augmented by the introduction of a device to hold an indicator bottle on a titration stand, a burette regulator, and a Flexaframe which can be assembled to form various size frames to support groups of apparatus. Castaloy die-cast appliances now number 23 different items.

The control of temperature also received the attention of a number of manufacturers who made distinct improvements on apparatus or developed new instruments.

The new Tenney drying cabinet has inside dimensions of 22 inches in depth and width, and 32 inches in height. It provides the means of controlling temperature from room temperature to 120° F. and humidity to 90%. Temperature is maintained by an electric heater and humidity is controlled by means of a small copper tank, spray nozzle and drain. A thermostat and humidistat make the unit automatic. The cabinet has an inner door of glass.

For storage of grease samples at air temperature before testing for consistency, there is a new Constant Temperature bath with compressor, heating element, motor and fan so arranged that an air bath can be maintained with $\pm 0.1°$ F. The unit is 44 inches long, 25 inches wide and 35 inches high.

There are two new models of heat control devices; the Burling type VI, single switch which will control temperatures from -100 to $+300°$ F., and the VD II with two switches which make it possible to control heating or cooling, to act as a high or low limit device, to give two or three step control, to provide floating control with reversing control motors and to give two or three speed control of auxiliary motors.

A new "Alnor" Electronic Pyrometer Controller is available in temperature ranges up to 3000° F. It automatically controls, at a predetermined point, the temperature of furnaces, melting pots, ovens and similar heating devices. An electronic principle is employed to control a switch by changing the capacity of a condenser in an oscillating circuit.

Weston has devised a metal thermometer for general laboratory use. The all-metal construction, airplane-type dial and the double helix coil of the bimetallic unit recommend this thermometer over mercury thermometers for many uses. The dial is mounted perpendicular to an

Left, the Carbanalyzer enables the rapid, accurate analysis of steel by electrical means.

Below, color analyses made with photoelectric devices, such as the Electrophotometer, are much more accurate than visual comparisons.

8-inch stem which contains the bimetallic unit. It is accurate to ½ of 1% over the full scale, and can be had in a number of temperature ranges.

Balances Makers Keep Apace

Chemists have had several new analytical balances added to the large list of splendid analytical balances made in the U. S. A.

Ainsworth has made an inexpensive analytical balance for student use, which has features not formerly embodied in a balance at its price. It is the Model LC which has a capacity of 200 grams, a sensitivity of 1/10th milligram under full load and a fall-away type of beam-releasing mechanism. Ainsworth also introduced a series of "cold-light" illuminators which are easily attached to any Ainsworth Balance.

Becker developed a Projection Reading Balance with a capacity of 200 grams. It provides rapid, automatic weighings from 1/10 mg. to 100 mg. by means of an illuminated and graduated micro scale which is magnified, projected and read on a matt glass screen. No weights below 1 gram are required. The balance employs a magnetic damping device for rapid operation.

New Gas Apparatus

Gases and vapors are forms of matter with which the chemist is constantly concerned, and there has been great activity in the instrumentation of this field.

Gas flow meters of a type called Rotometers are now available. Such a meter, the Fischer and Porter, has a transparent tube in which a small rotor floats. The greater the flow the higher the rotor is carried in the tube. In the simpler forms, the tube is transparent and the position of the rotor is read directly on a scale. Many forms are available including recording and controlling meters electrically operated. These meters may also be used to indicate and control the flow of liquids. Velocity of gas flow can also be measured by the Alnor Velometer.

The determination of carbon dioxide in gas mixtures is common practice and, a new compact and portable meter made chiefly of a molded transparent plastic, is called the Dwyer CO_2 Indicator. A portable electrical instrument for measurement of CO_2 content and temperature of a gas is the "Stack-O-Meter." Because carbon dioxide determination is so often involved in control of combustion processes, it is not surprising to find instruments which combine CO_2 determinations and draft measurement. Among these are the Dwyer CO_2 Indicator and Draft Gage.

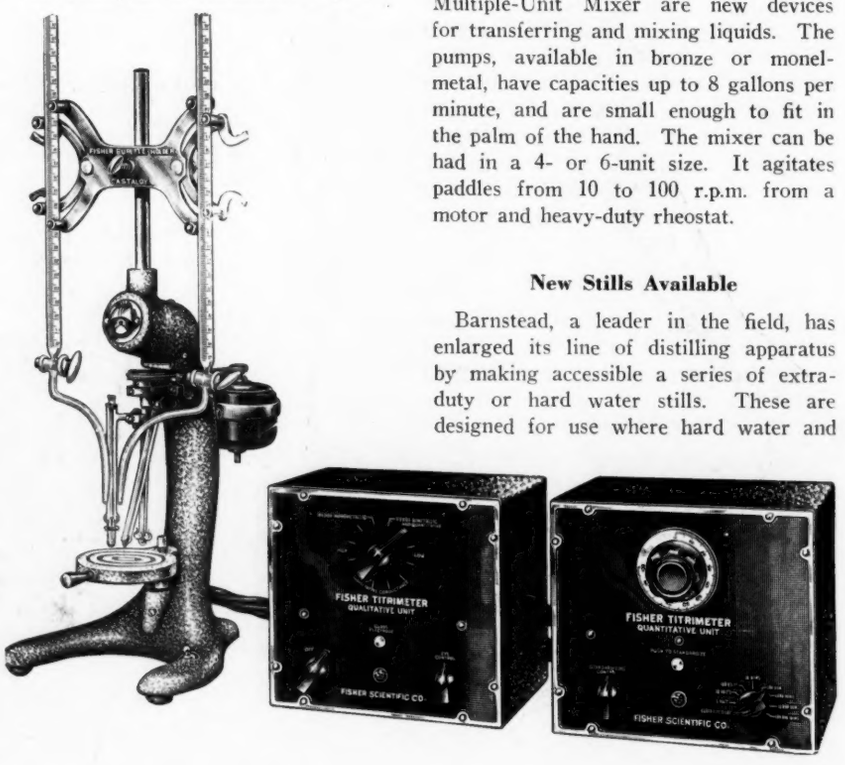
Gas composition is often determined by means of thermal conductivity measurements, and a new quartz conductivity cell more resistant to corrosive gases, is now available. A Hydrocyanic Acid Gas Detector, a CO Detector, a Benzol Detector, and an Oxygen Recorder and Controller are modern instruments recently devised. A portable, electrically operated Combustible Gas Detector is also available.

The modern laboratory of today is a far cry from the make-shifts of former years. Modern apparatus permits the chemist to do more easily, quicker and more efficiently operations in research and control work.

Gas pressures within the range 0-100 mm. of mercury may be measured with a precision of ± 1/10 mm. by means of the new Zimmerli Gauge. A new portable form of the McCleod Gauge for measurement of gas pressure in the range from 0 to 5 mm. Hg. is another new development.

Laboratorians can now obtain a new vacuum and pressure pump which evacuates down to a pressure of 1/10 mm. in a few minutes, and can be used as a source for compressed air. A new high-vacuum diffusion pump that can produce 10^{-6} mm. at 25° C., and claims a speed of 200 liters per second, is also available. It effects self-purification of pumping fluid during operation, even when reactive vapors are handled.

The electric eye of the Titrimeter reveals the exact end-point of volumetric analysis.



Combustion Bomb

Of interest to those who conduct combustion determinations is the new Satterlee-Parr Combustion Apparatus with its new combustion bomb. The apparatus has a stainless steel bomb cylinder of new design, convenient for the removal of residues after combustion. An improved peroxide bomb is designed to take a one-gram sample.

A Midget Circulating Pump and a Multiple-Unit Mixer are new devices for transferring and mixing liquids. The pumps, available in bronze or monel-metal, have capacities up to 8 gallons per minute, and are small enough to fit in the palm of the hand. The mixer can be had in a 4- or 6-unit size. It agitates paddles from 10 to 100 r.p.m. from a motor and heavy-duty rheostat.

New Stills Available

Barnstead, a leader in the field, has enlarged its line of distilling apparatus by making accessible a series of extra-duty or hard water stills. These are designed for use where hard water and

Simple new laboratory tool, handy for weighing-out material for loosening and removing chemical salts from bottles.

scale formation is encountered. The evaporators are placed higher to counteract the foaming and priming of hard water, and the still has a bleeder device to retard the rate of scale.

Measuring Moisture Content

A series of Tag-Heppenstall meters for measuring the moisture content of tobacco, grains and wood has been developed. They employ electrical means for determining the moisture content of various products. The rapidity of this method gives it a broad commercial application. Two other useful appliances are the Tag-A.S.T.M. bomb for determining the gum stability of gasoline, and the Tag-A.S.T.M. apparatus for determining the acid heat of aviation and motor gasolines.

Among new glass items now on the market are a Pyrex Kjeldahl Connecting Bulb, a Pyrex Micro Centrifuge Tube, Pyrex Measuring Pipettes with red graduations, Pyrex Reducing Adapter Tubes, Fiber Glass Filters, Spherical Joints, Automatic Reflex Still Heads and Automatic Burettes.

For cleansing glassware, Fisher has introduced Laboratory Calgonite, a detergent and water softener which removes all types of dirt from laboratory glassware, and saves much time and labor in the laboratory. A new device to clean a number of pipettes simultaneously has also been introduced by Fisher.

Micro Combustion Furnace

Micro chemists will be interested in a new Micro Combustion Furnace and a new Micro Auxiliary Heater designed by Fisher. Both of these are big improvements on the old Pregel appliance used heretofore.

Drs. M. R. Fenske and M. R. Cannon at the Pennsylvania State College devised a Modified Ostwald Viscosity Pipette for use in determining the viscosity of oils by A.S.T.M. standards.

The control of dust in industrial operations is facilitated by the new B. & L. Dust Counter, also a new portable Midget Impinger, recently announced. The former outfit combines the sampling and counting apparatus in a compact unit. The sample is drawn by a hand pump of 1/100th cubic foot capacity, the dust is deposited on a slide and the particles counted under a 200X microscope. The Midget Impinger weighs less than 10 pounds and is hand operated. It employs an ingenious 4-cylinder pump to draw in the sample at the rate of 1/10th cubic foot per minute. The air is passed through a 1-mm. orifice and collected in a suitable liquid.

A Pyrex Counting Cell for holding a dust sample for microscopical examination is a new item. It has a bottom section of optically polished glass, and a top section of finely ground glass with a 20 mm. circular opening.

New Visual Aids

Of importance to the chemist because it aids him in connection with the chemical literature is the advent of Microfilming. It is claimed that 90% of all the world's literature is now accessible for reproduction on 35 mm. film. The Photorecord makes such reproductions from the printed page, and these films can be studied under proper enlargement on a ground glass screen with the Argus Reader.

Further visual aid to the chemist is to be had in the Fisher-Hirschfelder Atom Models. By means of properly formed colored balls it is possible to build up models of molecules which conform on a scale of 100,000,000 to 1 with the actual forms of the molecules according to the latest scientific information.

The Electropode—new analytical instrument for qualitative and quantitative analyses in organic and inorganic branches of chemistry.

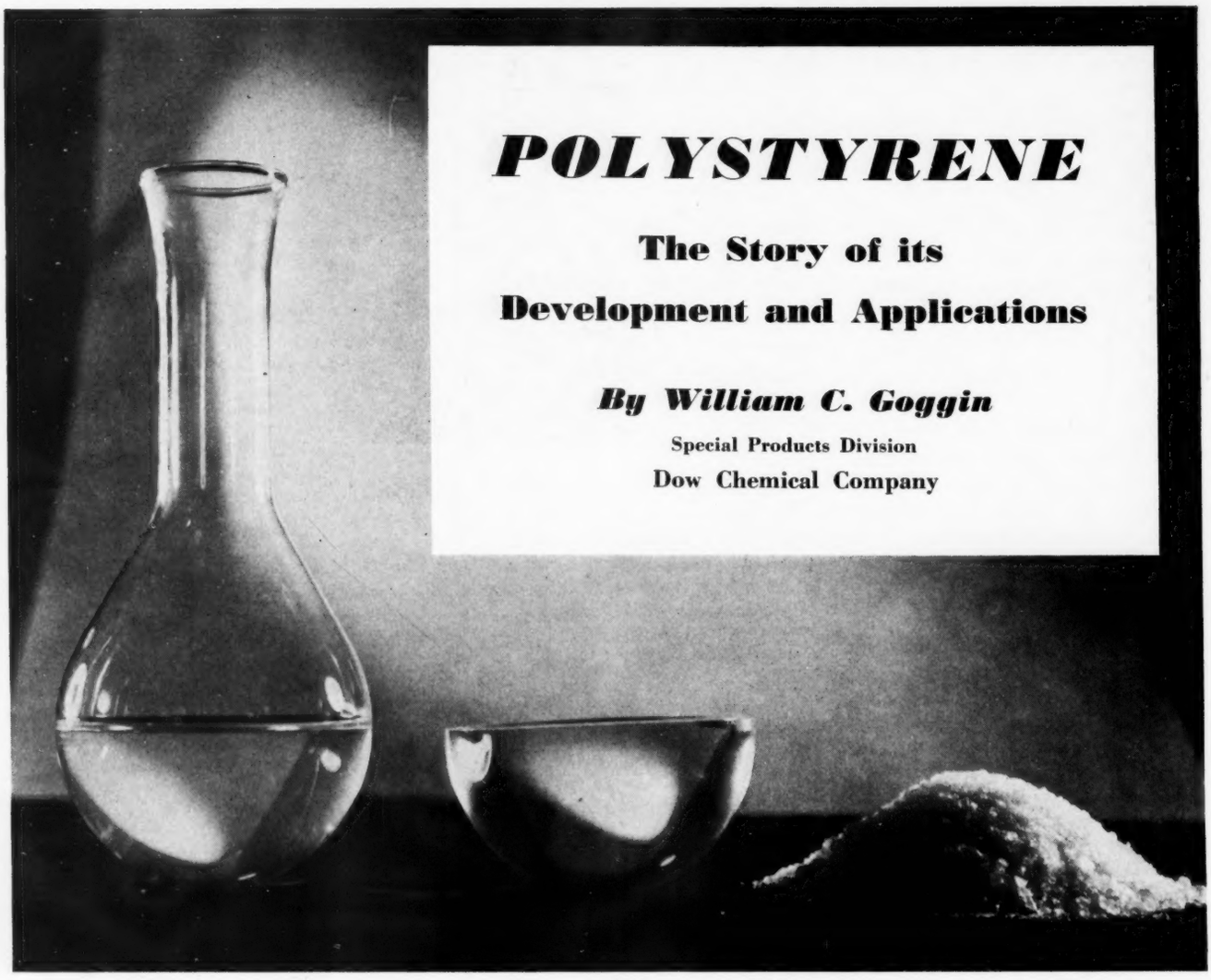
An abraser which measures the wear resistance, toughness, adhesion and rub-off qualities of finishes has been designed. Another new appliance is a gauge to measure the stiffness of paper, light metallic sheets and wire.

Scores of small devices having general application or specific uses have been devised. Among them are the following: Stop-Watch-Man, a plastic stopwatch holder; Scoopula, a handy tool to be used instead of a spatula for weighing out samples; Parafilm, a moisture-proof material for sealing containers; Desicooler, an all-aluminum desiccator; Neoprene tubing, gloves, policemen and stoppers; Alnico magnets, which are much stronger than ordinary horseshoe magnets; and test-tube markers, frosted celluloid marking surfaces in metal frames for attaching to test tubes.

From the foregoing it would seem quite evident that the American chemist and chemical manufacturer are now well supplied with the necessary tools for the conduct of their laboratory and plant work, and that they will continue to be presented with new tools as the needs for them arise.

Domestic Apparatus

While an effort has been made to present a representative listing of new laboratory appliances, obvious limitations both of space and general interest have prevented a completely inclusive report. Those who have followed closely the development and manufacture of laboratory instruments and apparatus are pleased to report, without bias, that the scientific apparatus made in the United States today is superior in design and utility to similar apparatus made abroad.



POLYSTYRENE

The Story of its Development and Applications

By William C. Goggin

Special Products Division

Dow Chemical Company

Left, styrene, a liquid monomer; center, polymerized solid block; right, injection molding granules of polystyrene.

POLYSTYRENE, the clear, transparent resin obtained from the polymerization of monomeric styrene, is one of the most recent of the plastics to acquire an economic significance. Although it has been known to science since 1839, it was not introduced to the commercial market in this country until a scant two years ago, when new developments made possible the production of a pure material in quantities.

The water-white monomer from which polystyrene is derived was isolated by Bonastre in 1831. He produced it from a distillation of storax (styrax)—a purified form of the balsam obtained by wounding the bark of the *Liquidambar Orientalis*, a tree indigenous to the region southwest of Asiatic Turkey.

The early literature does not reveal that it was known that this water-white fluid is gradually transformed by the action of heat and light into a resin of glassy appearance. Perhaps no one ever noticed it, for there are any number of chemicals which act as inhibitors to this process when present even in small amounts.

The thermal polymerization of monomeric styrene by the action of sunlight was initially observed in 1839 by Simon, who named the resin thus obtained "Styroloxyd," because he thought it to be a result of the oxidation process. Later, Blythe and Hoffman gave us the first clear description of the chemical, but progress with the material was slow. It was not until 1869 that the ethyl benzene process for making it was discovered by the French chemist, Berthelot, and not until 31 years later, in 1900, that commercial possibilities were apparently first envisioned. In that year Kronstein, describing polymerized styrene as "organic glass," indicated its use in the preparation of varnishes. Eleven years elapsed before the thread he had unraveled was picked up by another, Dr. F. E. Matthews of London, who was granted in 1911 two important patents disclosing several uses. In these he pointed out the excellent insulating properties of polymerized styrene and indicated its use in place of celluloid, ebonite, vulcanite, wood, and glass in the manufacture of various articles. He noted, that mixed with rubber it imparted hardness and toughness, which fact led him to suggest its use in the creation of wear- and high-temperature-resistant motor car tires.

Others were quick to follow in the trails blazed by these two pioneers. In the years immediately following 1911, considerable attention was centered upon polystyrene, both in this country and abroad, but it was doomed to be short lived. Preliminary experimentation uncovered a host of baffling production problems—serious obstacles to commercial development—and, one by one, American manufacturers lost interest.

There was for example the question of making the material. Processes then known were highly complex and expensive, necessitating a price that the market would not meet. Still another difficulty was encountered in the seeming impossibility of fabricating a pure product—one that would not "craze" (check on exposed surfaces) or "blush" (cloud). This fact gave rise to serious molding problems, spoiled the appearance of finished fabrications, impaired their efficiency. Finally, the high rigidity of

molded forms was looked upon as a definite limitation to their field of use.

Polystyrene as a commercial enterprise was nearly forgotten when the world went to war in 1914, although both during and after the war considerable work was done with the material in Germany. In this country it received but scant attention until the closing years of the post-war decade when the domestic need for a molded material of low power factor and low loss for use in the electrical industry, and the interest in transparent molding materials provided an impetus for further investigation. This time research men had the advantage of the discovery made in 1922 by Dufraisse and Moureu of particular agents that retard polymerization, making it possible to ship styrene to remote points where it can be redistilled and polymerized. Even with this discovery, however, the problems presented by the material discouraged manufacturers.

It was not until 1933 that American interest in polystyrene was reawakened to any considerable extent and domestic manufacturers once more adopted it for investigation. At last they were to solve its problems and give it a place among the growing list of plastic materials useful to man. In 1937, for the first time, after nearly a hundred years of research, American companies were able to produce a pure material of high quality in commercial quantity at a price comparing favorably with that of other plastic materials.

These achievements with polystyrene have been made possible, in part by the development of new manufacturing processes and, in part, by improvements in

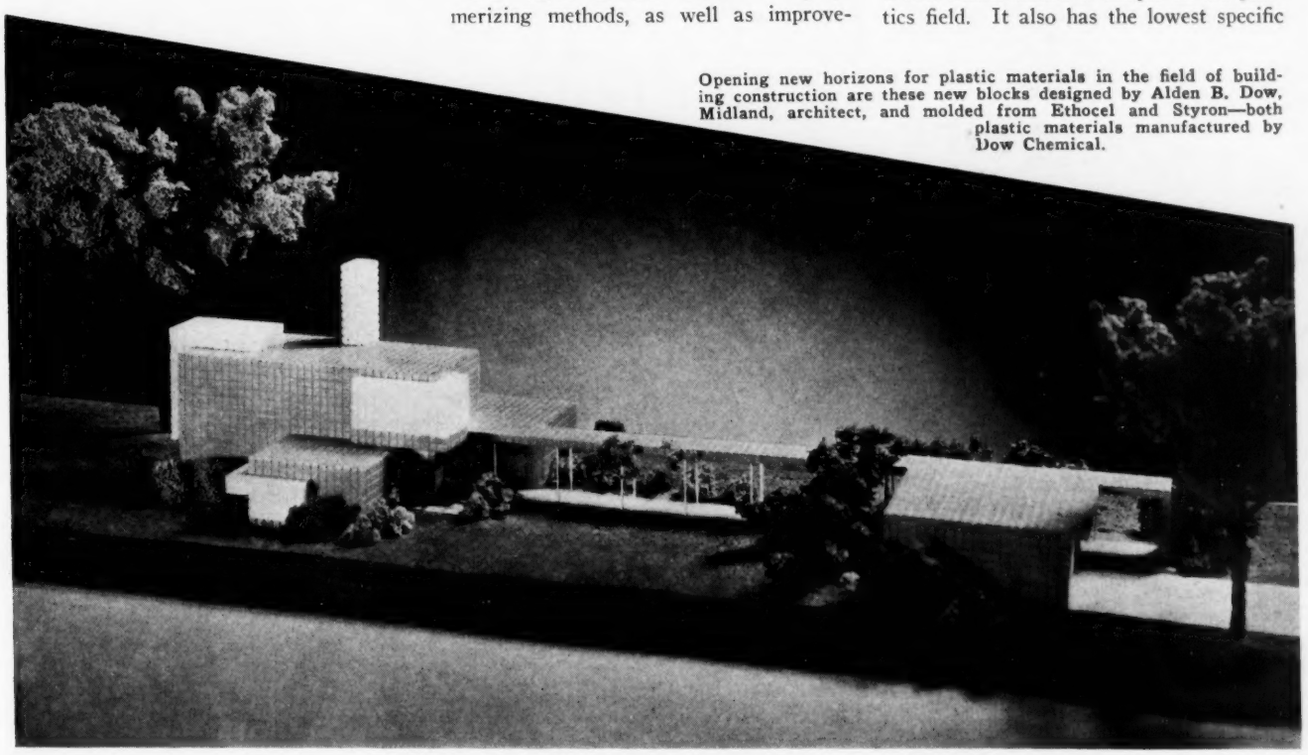
William C. Goggin

the quality and purity of the product. Styrene is now made from ethylene and benzene through ethyl benzene. It is polymerized to form polystyrene which is marketed in a granular form, either as a clear material or in any desired color. The purity of that now commercially available has given it better properties of heat resistance and light stability and has eliminated "crazing" and "blushing"—factors which kept it from the commercial market for many years.

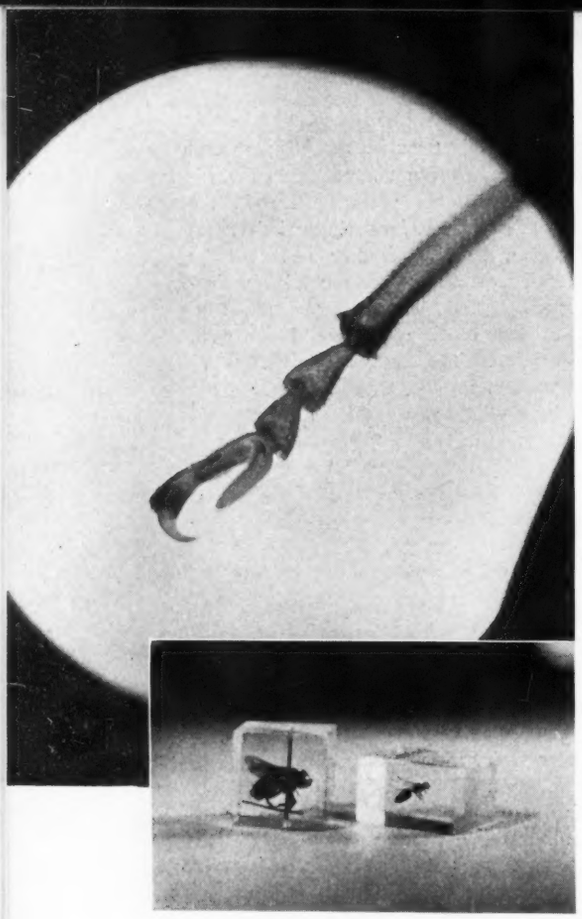
The more efficient control of polymerizing methods, as well as improvements in product consistency, has increased the heat distortion temperature of moldings. The present product has twice the elongation of that formerly available, and this can be still further increased by operations which stretch the polymer during cooling, enabling the production of threads and foil with several per cent. elongation. The high Young's Modulus of polystyrene is a very definite asset in such moldings as must have dimensional stability in the presence of varying mechanical forces. Polystyrene, with its extreme inertness at normal operating temperatures, occupies an enviable position in this regard, and moldings are dimensionally stable through a wide range of temperature, humidity, and loads. This characteristic, with its outstanding electrical properties has earned it an important place in the television industry.

The remarkable stability of the material under prolonged heat is shown in Graph I, a comparison of the dimensional change of Styron* (Dow polystyrene) with other commercial plastics at 50° and 70° C. The plastics tested were of the regular commercial quality. In making the tests, samples 1.75″ x 2.50″ with a thickness of .10″ were used. To determine the dimensional change, the width and length of each specimen was measured in two different places with an ordinary micrometer which reads to .001″ and an average taken. All samples were conditioned at 25° C. and 50 per cent. relative humidity before measuring.

The granulated resin is well adapted to the injection molding procedure, some 90 per cent. of polystyrene molding being done without the aid of any plasticizer—a fact which makes it unique in the plastics field. It also has the lowest specific



Opening new horizons for plastic materials in the field of building construction are these new blocks designed by Alden B. Dow, Midland, architect, and molded from Ethocel and Styron—both plastic materials manufactured by Dow Chemical.



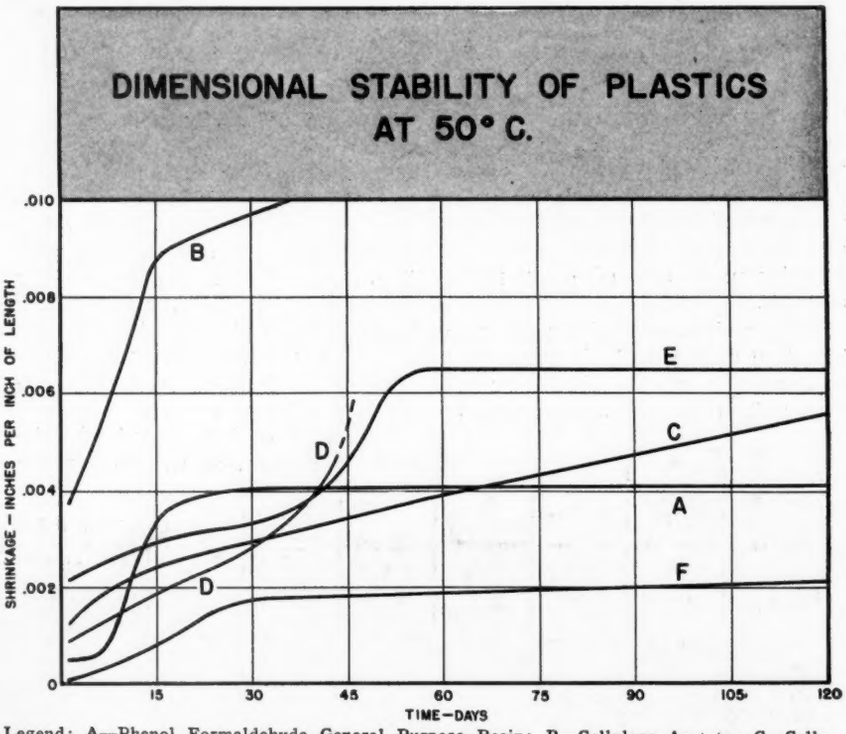
Remarkable properties of this clear, transparent synthetic resin make it an excellent medium for the preservation of natural history specimens. Mounted in this material, they may be easily studied microscopically as the photomicrograph shows.

gravity (1.05) of any commercial resin, which makes it possible to obtain more moldings per pound. The strength of these moldings compares favorably with that of other thermoplastics (7-9000 pounds per square inch, tensile strength) despite low specific gravity. Through the use of highly polished molds, decorative finishes and optical surfaces are obtained on fabrications, the surface of the material retaining the finish of the mold. In its natural state polystyrene yields moldings of crystal clear transparency, but it may be colored to any color ranging from transparency through opacity. The flow characteristics are such that the thinnest sections may be readily filled at temperatures and pressures within the ranges used for other thermoplastics.

Polystyrene may also be fabricated to special shapes which may be readily machined and polished. It may also be used for the permanent preservation of biological specimen enclosed in a solid block of clear transparent resin prepared from the monomer.

A unique property of the material is the manner in which it transmits light through rods or sheets, carrying it around curves and bends. Light transmitted in this manner may be made to illuminate sections along the rod, or travel through it and be released at the extremity. The former principle is used in the illumination of aircraft instruments by inserting an open ring of polystyrene inside the dial. Light from a small lamp enters the ends of the ring dispersing itself along the rod. This light is uniform and shows no glare. The other principle, that of allowing most of the light to escape from an end, is used in illuminated signs and scientific instruments with very novel, but practical effect.

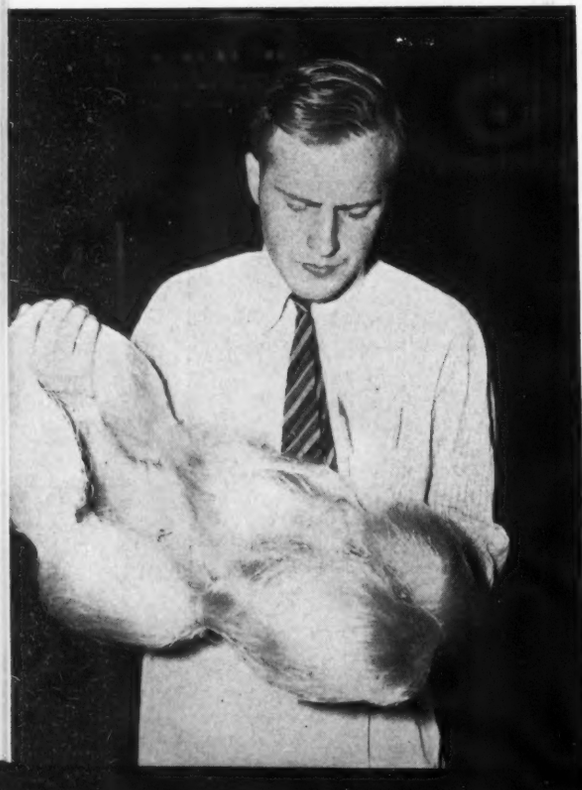
Polystyrene has long been known to be an excellent dielectric medium. It has an unusually low power factor, high dielectric strength, great arcing resistance and low water absorption. The dielectric strength in thin sections is equivalent to that of excellent mica—5,500 volts per mil—high compared to other plastics. It maintains its good electrical properties and its low losses even under the adverse conditions of temperatures approaching the softening point of the material. This property is especially desirable in an insulator operating under high voltages where increased losses at higher temperatures tend to increase the temperature indefinitely, thereby causing breakdown. The dielectric constant varies little with frequency, a definite indication of low losses. Polystyrene shows a power factor of only 0.04 per cent. at wave lengths of 60 to 150 cm. It has been used as low-loss insulation at wave lengths of 1 to 2 cm. and for infrared transparent windows at wave lengths of 0.005 cm. The power factor is little affected by increased voltage gradient, even at radio frequency. Because of these properties it is being used for coaxial and concentric radio frequency cables.



Legend: A—Phenol Formaldehyde General Purpose Resin; B—Cellulose Acetate; C—Cellulose Acetate Butyrate; D—Methyl Methacrylate; E—Ethyl Cellulose; F—Styron* (Dow polystyrene). The 70° C. test was concluded at the end of 25 days because of the abnormal distortion of some samples.

Films are suitable for use as condenser foil or as cable wrapping, and solutions containing the material as the major non-vaporizable component are being sold as electrical insulating varnishes. The radio industry uses such solutions by spraying, dipping or painting as "dope" for coils.

The excellent chemical and moisture-resistance properties of polystyrene have long pointed to its adaptability in the field of protective coatings as an ingre-



Exhibiting unusual toughness and resistance to acids, alkalies, solvents and water is vinylidene chloride resin, a new thermoplastic material developed by Dow. Extruded cordage with a remarkably high tensile strength has been fabricated.

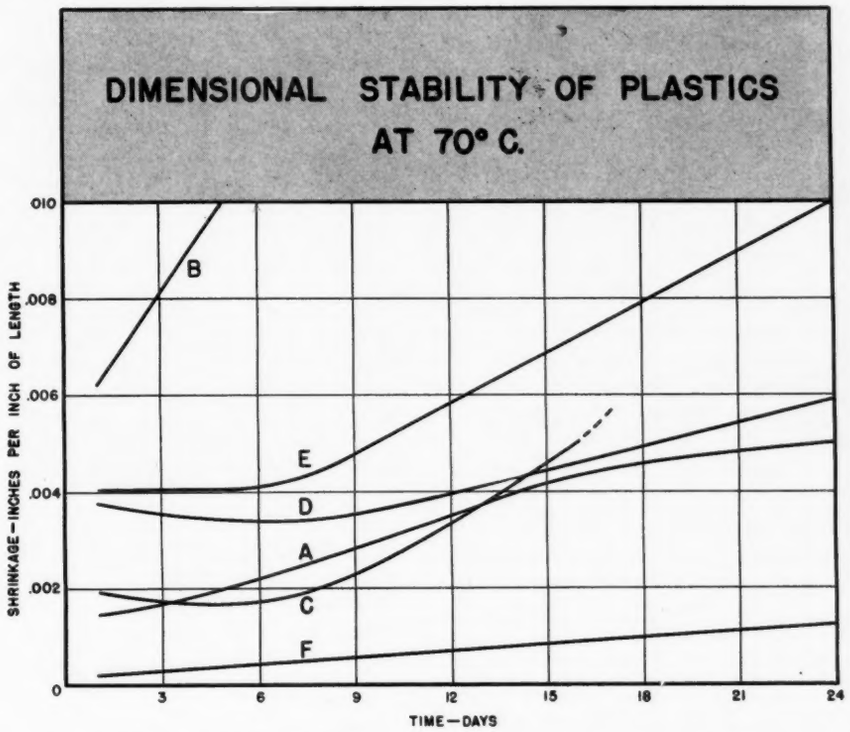
dient of paints, varnishes and lacquers. As previously noted, Kronstein indicated this use as early as 1900. Although some successful solutions were made, the high molecular weight polystyrenes formerly available were not compatible with the drying oils and other ingredients usually used in paints and varnishes.

Recently published information indicates that the lower molecular weight materials that can now be made offer the solution to this problem of drying oil compatibility and in addition have the following desirable properties: high chemical and moisture resistance, color stability, elasticity and pliability. They brush easily and level to form a remarkably smooth surface with high gloss. Such coatings adhere well, dry properly, show good abrasion resistance and are very durable. Their outstanding electrical properties make them useful for insulating purposes and their flexibility and moisture resistance—seldom found together in oleoresinous coatings—make them adaptable for textile coatings, transparent packaging films, tapes for electrical insulation.

The fact that this material has the lowest water absorption of any commercially known plastic adapts it for use in humid climates as well as where continual immersion in water is required.

One of the outstanding characteristics of polystyrene is its extraordinary chemical and solvent resistance. It is not affected by glycerine, naphtha or glycols and is resistant to practically all alcoholic materials, concentrated acids and alkalies

In X-ray and spectroscopy work where minute traces of impurity nullify caustic analyses, polystyrene containers for caustic samples are being used in place of glass which is etched by the strong chemical, thus contaminating the sample. Polystyrene moldings are also extensively used as bottle closures, and dispensers for corrosive chemicals and alcohol.



Permanence Properties of Styron* (Dow Polystyrene) Exposed to Chemical Reagents 24 Hours at 30° C.

Reagent	% Change in Weight
Hydrochloric Acid (Conc.)	+0.05%
Hydrochloric Acid (15%)	0.00
Nitric Acid (Conc.)	+0.46
Nitric Acid (15%)	+0.42
Sulfuric Acid (Conc.)	—0.01
Sulfuric Acid (15%)	0.00
Sodium Hydroxide (5%)	0.00
Sodium Hydroxide (20%)	0.00
Glacial Acetic Acid	+0.50
Acetic Acid (15%)	+0.01
Calcium Chloride (10%)	0.00
Ammonium Hydroxide (Conc.)	+0.15
Ferric Chloride (45%)	0.00
Phenol (5%)	+0.03
Sodium Chloride (10%)	0.00
Saturated Bromine Water	+1.78
Saturated Chlorine Water	+0.40
Water	0.00
Carbon Tetrachloride	Soluble
Tetrachlor Ethylene	Soluble
Ethylene Dichloride	Soluble
Propylene Dichloride	Soluble
Benzene	Soluble
Orthodichlor Benzene	Soluble
Ether	Soluble
Toluene	Soluble
Ethyl Acetate	Soluble
Amyl Acetate	Soluble
Acetone	Solvates
Naphtha	+0.49
Kerosene	+0.25
Ethyl Alcohol	+0.08
Glycerine	—0.03

Polystyrene is used for reagent bottle closures and acid dispensers, because of its high chemical resistance. Center, coaxial cable spacings, condenser housing and coil forms illustrate some of the applications to the radio and television industries. Ability to maintain its strength at —30° C. makes it adaptable for refrigerator moldings.

* Trade Mark Reg. U. S. Pat. Off.

The solution of production problems resulting in the removal of objectionable impurities and the creation of a pure material, the development of injection molding techniques, economical price—all developments of the past six years—together with the outstanding properties of the material, have combined to give polystyrene an increasingly important place in the plastics picture. It has already found extensive applications since its introduction to the market a scant two years ago, and its field of use becomes continually more well defined. Developments now in progress promise even greater achievements for the future.

After a hundred years of experimentation, polystyrene today occupies an important place among the plastic materials useful to man.

New Processes

Process for Phthalic Anhydride

Parks and Allard, Rhode Island State College, studying the vapor-phase catalytic oxidation of xylene with air, find that the principal products of oxidation are toluic aldehyde and phthalic anhydride. By selecting the proper metal oxide catalysts, and controlling the air/-xylene ration, yields of anhydride from 45% to 85% of the theoretical can be obtained, they report. At 520° C., employing vanadium pentoxide on Alfrax, good yields of anhydride are obtainable, provided that a very large excess of air is used—air/xylene ratio should be equal to 30 or more. The investigators found that certain oxide catalysts, namely, zirconium, molybdenum, and tungstic oxides, can convert xylene only to the aldehyde stage, although it is not stated whether or not any of the heavier metal oxides produce anhydride exclusively. The apparatus and methods involved in these experiments are presented in *Industrial and Chemical Engineering*, Sept. '39.

Oxalic Acid from Molasses

Molasses is mixed with twice its weight of 50% nitric acid, and heated at 65-75° C. under about 200 mm. pressure in a vacuum chamber. Present in the reaction mass is a trace of vanadium pentoxide (about 0.002%) catalyst. Following this or a similar method, described in English Patent No. 510,057, oxalic acid can be recovered in yields of at least 70%, according to the report outlined in *Chemical Trade Journal*, Sept. 22, '39, p. 239. Process, developed by the Polish State Nitrogen Fixation plants in Moscici and Chorzow, is designed to maintain the concentration of nitric acid at a level insuring a high yield of oxalate, while minimizing the free oxides of nitrogen whose presence in solution reduces the quantity of oxalic acid that can be finally recovered.

Electrolytic Manufacture of Arsenates

L. Löwenstein describes an efficient electrolytic cell for oxidizing sodium arsenite to the arsenate, in a paper presented before the Electrochemical Society at its September meeting in N. Y. City. Recommended is a cylindrical cell, comprising a nickel gauze cylinder wrapped with several layers of asbestos paper, over which is fitted a second nickel gauze cylinder. Such a cell may be about 15 inches high and 8 inches in inside diameter; 10, 20, or more such cells can be connected in parallel, placed close together in a nickel-plated iron chamber. Oxidation of arsenite occurs best at about 60-75° C., in the presence of a small proportion of chromate, provided that the arsenite concentration is maintained at 10% or more. Sodium arsenate is made to separate out in a special compartment, by regulating the flow of anolyte through the anode (oxidizing) compartment so that the arsenate concentration is close to saturation on leaving the anode. Current efficiency is calculated at about 98%, about half a kwh.-hour being consumed per kg. of arsenate.

Starch-Formaldehyde Plastics

According to English Patent No. 506,-553, satisfactory water-resistant moulded articles can be made from the condensation products of commercial starch (e.g., potato starch) with formaldehyde and urea. In an example, 200 g. commercial starch are mixed with 80 cc. of 40% formaldehyde and 8 g. of urea (previously dissolved in 16 cc. of water containing 1 cc. of lactic acid). The mixture is heated in an autoclave for 1-2 hours at 90° C. The solid mass obtained is ground and dried to a water content of about 8%, yielding a hard powder. The powder is mixed with 18 cc. of 40% formaldehyde containing 9 g. of urea and 4 cc. of 25% ammonia, filled into a mold and pressed. The clear, colorless object produced is said to be hard but elastic. By varying the quantities of starch and formaldehyde, the hardness of the resins can be controlled to a certain degree. (*Chemical Trade Journal*, July 28, '39, p. 85.)

Sulfamates in Electrometallurgy

Because sulfamic acid forms readily-soluble salts with most of the heavy metals (unlike the majority of other strong mineral acids), it has quickly found application in electroplating processes. The *Chemical Trade Journal*, Sept. 22, reviews editorially on p. 236, the results obtained and reported by several investigators working with the heavy metal sulfamates.

Mather and Forney, Indiana University, presented a paper at the N. Y. meeting of the Electrochemical Society in September, showing that smooth, finely-crystalline, tough lead deposits can be obtained from a solution of lead sulfamate containing suitable addition agents. They claim that, in some respects, the sulfamate was superior to the fluosilicate in this process. Piontelli and Giulotto, Milan University (Italy), have investigated the electrolysis of the sulfamates of a large number of the heavier metals and find that the process is suitable for the refining of copper, silver, iron, nickel, cobalt and lead, as well as for the more exacting electroplating of copper, iron, nickel, cobalt, cadmium, and rhodium.

Blanc Fixe from Heavyspar

An improved process for preparing pure white barium sulfate from natural heavyspar is given in German Patent No. 677,147, issued to Sachthleben A, G. fur bergbau und Chemische Industrie, Cologne, Germany. The method is reported in *Chemical Trade Journal*, July 28, '39, p. 78, comprising igniting the heavyspar in lump form at 1300-1350° C. in the presence of small quantities of carbon-containing compounds, the object being to reduce some of the sulfate to sulfide, the latter precipitating heavy metal impurities on solution of the reaction mass. After fusion, the batch is quenched in dilute mineral acid (hydrochloric, together with various quantities of other mineral acid). The barium sulfate thrown down on quenching is stated to be of exceptional whiteness and purity, and the process has the further advantage of eliminating preliminary pulverizing of the heavyspar mineral.

Chemicals from Lignin

Harris, Saeman, and Sherrard presented a paper before the Division of Cellulose Chemistry at the Boston meeting of the American Chemical Society, describing hydrogenation products obtained from lignin. Using Raney nickel catalyst, they reported that hydrogenation of lignin in aqueous solution yielded a variety of organic compounds, including methanol, propylcyclohexane, hydroxypropylcyclohexanes, and a colorless resin fraction. The last, they found, could be separated into alkali-soluble and alkali-insoluble components.

"Phenolex"

Material comprises a silver-bright aluminum paint in paste form. Packed in containers holding both paste and vehicle, ready to mix, it can be brushed or sprayed on metal, wood, and concrete, according to the formulator. Coating is put up in 4 different grades, according to the use intended; it may be had either for ordinary domestic and commercial use, resistant to normal steam heat, or for applications on all surfaces with excessive heat up to 932° F., such as boiler fronts, kilns, steam lines, etc. "Phenolex" is said to dry hard overnight to an elastic film.

Hydrogenated Coal-Tar Chemicals

By George R. Lawson

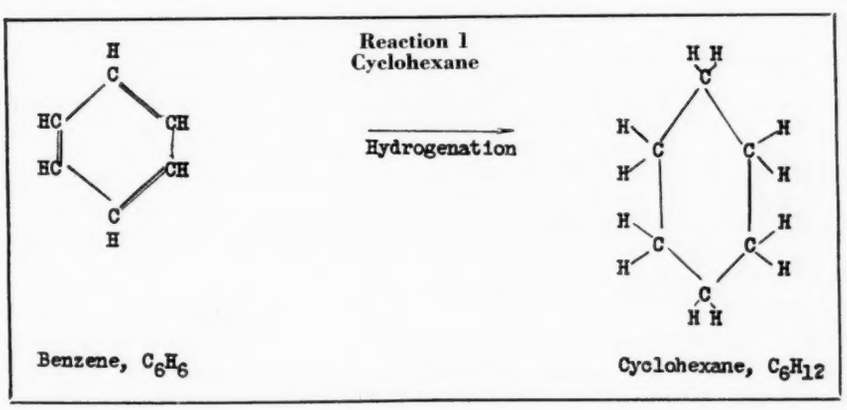
The Barrett Company

RESEARCH in the field of coal-tar chemicals has a long and fruitful record in the discovery and isolation of new products which have enriched modern civilization. Every student chemist is familiar with benzene, toluene, xylene, naphthalene, phenol, pyridine and with many of the derivatives which they yield after various methods of treatment.

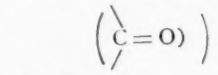
Modern hydrogenation technique has added another group to this growing family of coal-tar products, and in this article are described a few of the elementary hydrogenated coal-tar chemicals. Their more important physical and chemical properties are given, as well as some of the uses which industry is quickly learning to make of them.

Cyclohexane

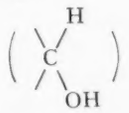
Benzene, C_6H_6, is the mother substance of the coal-tar or aromatic hydrocarbon series. Its catalytic hydrogenation yields cyclohexane, sometimes called hexahydrobenzene, hexamethylene, or naphthene. The hydrogenation reaction, illustrated with structural formulas, adds hydrogen as below:—



The process has changed an unsaturated compound, in this case one containing double bonds, to a completely saturated hydrocarbon, or one containing only single bonds. As chemistry teaches, the double or triple bond is not an indication of strength, but rather one of weakness, in that it indicates the possibility of chemical reactivity at that point. The saturated products then, are more chemically stable and inert. To this saturated condition can be attributed the chemical inactivity of the ring in this series. As will be shown later, a ketone grouping



or alcohol linkage



in a hydrogenated coal-tar chemical produces a more active compound.

Properties of Cyclohexane

As for the properties of cyclohexane, the accompanying chart shows that it is a water-white, neutral, non-corrosive, volatile liquid. It is miscible with most other organic solvents and has an odor superficially similar to that of carbon tetrachloride. Cyclohexane is an excellent solvent for most fats, oils and waxes, for crude rubber, bitumen and ethyl cellulose. Industrially it can be utilized for the recrystallization of some fine chemicals, in the extraction of essential oils, as a degreasing agent, as a vehicle in liquid-phase hydrogenation and in the compounding of printing inks, lacquers and like products.

Methyl Cyclohexane

The catalytic hydrogenation of toluene, C_7H_8, yields methyl cyclohexane or hexahydrotoluene, according to reaction 2 shown on next page.

Methyl cyclohexane exhibits properties generally similar to those of its homologue, cyclohexane. The two chemicals have many common uses and in numerous instances are interchangeable, depending on the boiling point and evaporation rate desired. Methyl cyclohexane, as seen from the chart, has the higher boiling range and slower evaporation rate.

Cyclohexanol

Cyclohexanol is the saturated, cyclic, secondary alcohol produced by hydrogenating phenol. It is also known as hexahydrophenol. See Reaction 3, next page.

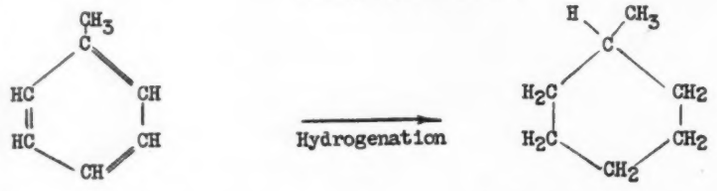
The hydrogenation of phenol has satisfied the reactive characteristics of the ring structure and the ring has now become relatively inert. Furthermore, in this change from an unsaturated hydrocarbon ring the characteristic reactions of the adjoined hydroxyl (OH) group have been altered to such an extent that it has lost its acidic character and now exhibits the properties of an alcohol.

Pure cyclohexanol is normally an oily, water-white liquid with a camphoraceous odor. The pure product has a freezing point slightly below room temperature. Small amounts (1 to 5%) of water or organic solvents cause this to drop rapidly.

Cyclohexanol is miscible in all proportions with most aliphatic, aromatic, hydrogenated and chlorinated hydrocarbons, and with the usual lacquer solvents. It has good solvent power which makes it effective as a "mutual solvent" and homogenizer, promoting solution when added to other solvents which by themselves are not miscible either with each other or with water. Cyclohexanol and water are not mutually soluble in all proportions, but the addition of a small amount of soap promotes a clear solution.

Industrially, the applications are numerous. Cyclohexanol is an effective aid in some wetting-out preparations and also an excellent emulsion stabilizer. It is, furthermore, a solvent for most oils, fats, waxes, basic dyes and many natural and synthetic resins. In the soap industry it

Reaction 2
Methyl Cyclohexane



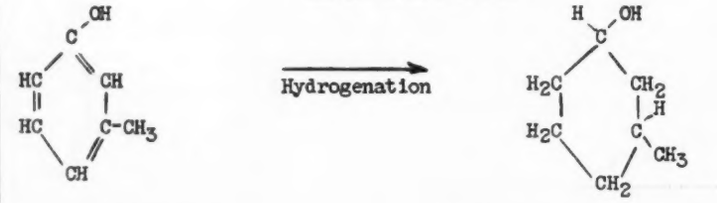
Toluene, $C_6H_5CH_3$ — Methyl Cyclohexane $C_6H_{11}CH_3$

Reaction 3
Cyclohexanol

Phenol, C_6H_5OH — Cyclohexanol, $C_6H_{11}OH$

is being utilized in the preparation of solvent soaps used in the dry-cleaning, textile, leather, laundry and allied fields. Such soaps possess excellent solvent, detergent and emulsifying powers. In nitrocellulose lacquers, it is used as a high boiling "reenforcing" alcohol to retard evaporation and prevent blushing, and to aid in the compatibility of gums and resins.

Reaction 4
Methyl Cyclohexanol



Cresol, $CH_3C_6H_4OH$ (Meta form) — Methyl Cyclohexanol $CH_3C_6H_{10}OH$ (Meta form)

This useful chemical is valuable as a solvent in various applications in many industries, and several derivatives of it are in themselves commercially important. One of the oxidation products of cyclohexanol is adipic acid, and many of the esters formed with various acids are or can be used to advantage. Its use in condensation reactions in the formation of modified synthetic resins is a field just being opened up.

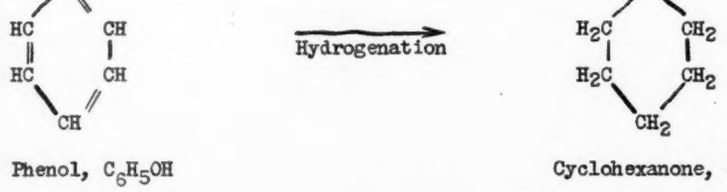
Methyl Cyclohexanol

Methyl cyclohexanol is a mixture which may contain all three of the isomeric, saturated, cyclic, secondary alcohols produced by the hydrogenation of cresols. The product can vary according to the composition of the original cresol. The three forms are the ortho, meta and para, depending on whether the methyl (CH_3) group is in the first, second, or third position on the ring with respect to the hydroxyl (OH) group. See Reaction 4.

Methyl cyclohexanol in general exhibits properties similar to those of cyclohexanol, but in some instances is not as powerful a solvent as the latter. However, in most cases the two are interchangeable, depending on the boiling range and evaporation rate desired.

The methyl compound is sometimes preferred over cyclohexanol in dry-cleaners' preparations, and has application in soaps used to clean rubberized fabrics and materials.

Reaction 5
Cyclohexanone



Phenol, C_6H_5OH — Cyclohexanone, $C_6H_{10}O$

In some types of varnishes its addition aids in producing complete and homogeneous solutions, and imparts anti-skinning properties.

The esters of this alcohol are also of commercial importance.

Cyclohexanone

Cyclohexanone is the saturated cyclic ketone produced by the controlled hydrogenation of phenol.

In this case the process has taken the unsaturated acidic phenol and saturated the ring. Outside the ring it has caused a rearrangement in the molecular structure to produce a

or ketone group. As is generally the case with ketones, cyclohexanone is an excellent solvent, and upon this property is largely dependent its industrial usage. The pure product is a neutral water-white liquid with the characteristic ketone odor. It is miscible with the usual lacquer solvents and diluents, hydrogenated and chlorinated hydrocarbons.

Because of its excellent solvent properties, it is used in the lacquer and enamel industries as a blending agent. It is a solvent for a wide variety of materials, including cellulose esters and ethers, crude rubber, ester gum, colophony, elemi, kauri, manila, orange and bleached shellac, some phenolic resins, both modified and unmodified, alkyds, some vinyl resins, cyclohexanone resins, oils, waxes, bitumen and basic dyes.

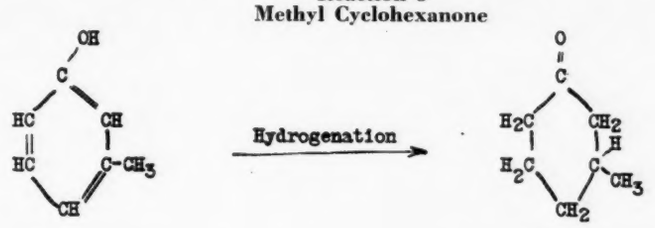
Converted to Resins

Cyclohexanone can be converted to synthetic resins. Although as yet the products are not of commercial significance, in many respects they show promise.

Methyl Cyclohexanone

Methyl cyclohexanone is a mixture which may contain all three of the isomeric, saturated, cyclic ketones produced by the controlled hydrogenation of

Reaction 6
Methyl Cyclohexanone



Cresol, $CH_3C_6H_4OH$ (Meta form)

Methyl Cyclohexanone $CH_3C_6H_9O$ (Meta form)

cresols. The product can vary according to the composition of the original cresol.

Methyl cyclohexanone in general exhibits properties similar to those of cyclohexanone. Choice between the two again depends on the properties desired.

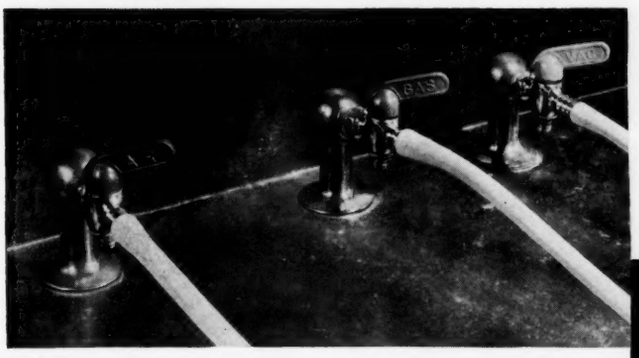
It does, however, have one quite special use, i.e., its employment in crystallizing lacquers where its high solvent powers and low evaporation rate promote good crystal growth.

A New Coal-Tar Chapter

These six hydrogenated materials, founded upon four coal-tar products, represent the introductory paragraph of a new chapter of the ever unfolding story of coal-tar products.

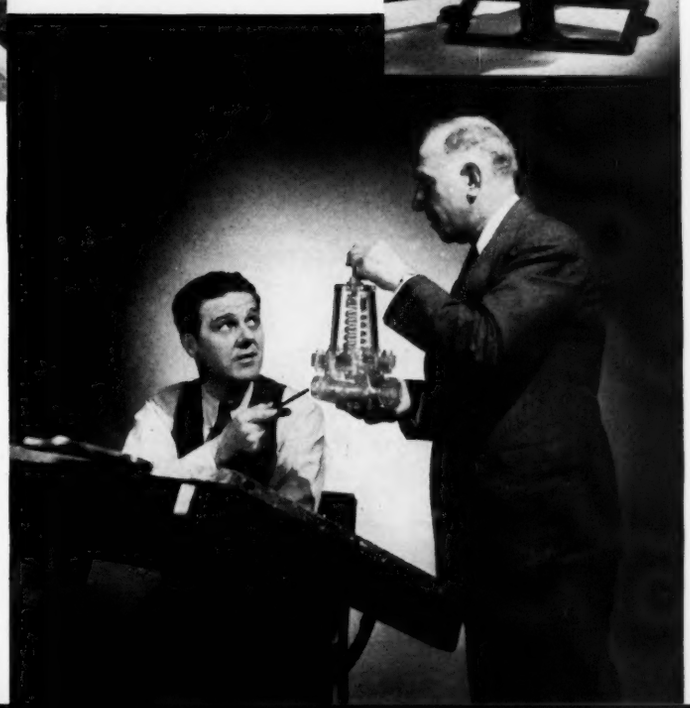
PROPERTIES OF PURE HYDROGENATED COAL TAR CHEMICALS

	Cyclohexane	*Methyl Cyclohexane*	*Cyclohexanol*	*Methyl Cyclohexanol*	*Cyclohexanone*	*Methyl Cyclohexanone*
Molecular Weight	84.15	98.18	100.15	114.18	98.14	112.16
Pounds per Gallon	6.5	6.4	7.9	7.6	7.9	7.6
Refractive Index at 25° C./4° C.	1.425	1.421	1.464	1.456–1.460	1.448	1.442–1.444
Boiling Point, ° C.	80.8	101.2	160.7	172.0–175.3	155.6	169.0–170.5
Specific Gravity at 25° C.	.774	.764	.944	.911–.914	.942	.910–.912
Solidification Point, ° C.	6.5		24			
Color	Water White	Water White	Water White	Water White	Water White	Water White
Evaporation Rate (Toluene = 100) (approximate)	195	140	8	4	30	20
Acidity	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Residue from Evaporation	None	None	None	None	None	None
Effect on Metals	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive
Flash Point (approximate)	Less than 10° F.	Less than 10° F.	68° C. (155° F.)	68° C. (155° F.)	47° C. (116.5° F.)	53° C. (128° F.)
Solubility in Water at 20° (approximate)	Insoluble	Insoluble	4-5%	3-4%	8-9%	2-3%

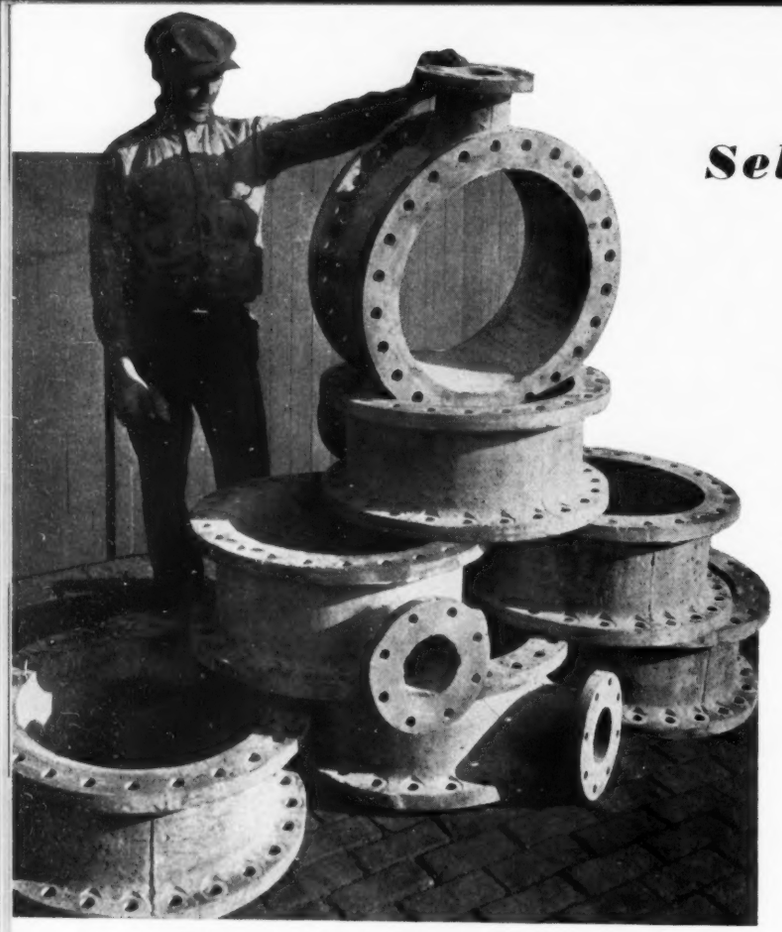


Color Means Safety—The contrasting color of these new Bakelite plastic handles made for the Glauber Brass Manufacturing Co. eliminates danger of opening wrong valve. Greater safety is made possible by having the name of each hose cock molded right into the handle. Being chemical-resistant, they are not affected by strong acids and alkalies. Molded by Ziwel Plastics Company.

Right, The Hays Corp.'s Orsatomat, molded by Modern Plastics Corp. with dies from Victor Tool Co. Investigators may watch process through its Du Pont Lucite walls.



Progress in plastics is shown by these two winners (right and insert above) in the *Modern Plastics* Magazine Competition. Right, transparent valve, replica of A. W. Cash Co.'s metal reducing valve, permits vision of working parts. The designer, Dave Sedlow, fashioned it from Röhm & Haas Co.'s Plexiglas.



Above, pure nickel provides rugged equipment for the ammonia oxidation process

Selection of Safe Metals for Chemical Equipment

By Paul V. Faragher, Ph.D.*

Aluminum Co. of America

IT might appear that the discussion of the factors involved in the choice of metals for use in the chemical industry would differ greatly depending upon the interests of the readers. From the standpoint of emphasis and the detail of the treatment, that is undoubtedly true but the same general principles must be considered by the safety engineer as by the chemical engineer.

If that were not true, and the different factors could be divorced from each other, this presentation of the subject might be made both brief and simple.

Of all the metals, gold and platinum are among the most resistant to the widest range of chemicals. Since the prevention of accidents is your principal concern, the selection of one of these metals would appear to offer a complete answer to your problem insofar as failure from chemical causes is concerned.

Where greater strength was required than would be obtained even with a considerable thickness of one of these precious metals, it would be sufficient to specify that it shall be re-enforced with a steel sheet. That such re-enforcement might present serious difficulties in constructing and operating the equipment need not concern you, since that would be something about which the mechanical engineer or chemical engineer should worry.

It is obvious that economic considerations cannot be divorced from the treatment of this subject, even though your only responsibility to your employer is that his operating personnel shall not be injured through failure of the equipment of improper operating practices.

The cost of the installation depends, of course, upon the materials which are chosen for its construction. The unit selling price of the resulting product must include the proportionate share of interest, taxes and depreciation on this initial

Hastelloy C shafts for use in large autoclaves in a chemical plant

*Paper delivered before the Chemical Section, National Safety Council, Atlantic City Convention, Oct. 17.

investment. Thus, the market for the product is at once an important factor in the choice of materials.

However, in the chemical industry in particular, the first cost of the plant may easily be of secondary importance in comparison with two other items which also enter in the cost accounting—"R & M" and Compensation. "R & M" is, of course, "Repair and Maintenance," while compensation relates to that part of your activities which affects the balance sheet rather than to the humanitarian side of your work. These items of cost, together with depreciation, may be the outstanding factors which determine the choice of metals for chemical construction.

However, not infrequently the governing factor in the choice is not the effect of the product on the metal, since several materials may be available, all of which would give substantially equally satisfactory life for the installation, but rather the effect of the metal on the quality of the resulting product. For example, the choice between two otherwise equally suitable metals may be decided by the fact that the compounds of the one are colorless or are non-toxic to the human organism or to yeasts or enzymes or other organic catalysts of biochemical reactions. Then, too, the rate of decomposition of some chemicals, e.g., hydrogen-peroxide, is enormously accelerated by minute traces of certain metal salts, while others have no effect whatever. Similarly, hydrolysis of certain organic compounds is catalyzed by compounds of some metals, a fact which must be considered in the processing of edible fats and oils.

Variety of Metals

Fortunately for the chemical industry and, consequently, for industry in general, it is not necessary to resort to the extreme of specifying platinum or gold for chemical equipment. From the greater number of metals and alloys which are now in commercial production, there is a wide choice of metallic materials having adequate resistance to corrosive attack and other properties even superior to those of the noble metals, including the essential requirement of cost within the range which makes their use practicable.

From the standpoint of your immediate responsibility, you are not too greatly concerned as to why the equipment in your plants has been made from the particular metals which have been used. However, it may be interesting to know some of the considerations which have led to their choice.

You are doubtless familiar with the alloys which find most general application; stainless, or more properly, corrosion resistant steels, in which chromium and nickel are the alloying elements, combine strength, ability to be formed and welded, with good resistance to the attack of the

Paul V. Faragher, Ph.D.

atmosphere as well as that of a number of chemicals. In fact, in the published lists of common chemicals which indicate the alloys which are not appreciably attacked by them, the corrosion resistant steels are among the most frequently mentioned.

High silicon iron alloys in the form of castings are also recommended for use with many chemicals which are corrosive to many of the alloys, notably inorganic acids including hydrochloric.

Lead lined tanks are used extensively for sulfuric acid and for hydrofluoric acid, because of its resistance to corrosion and its economy, the sheet lead being readily fabricated and seams made by welding or "lead burning," as it is called.

Nickel and the nickel copper alloys, monel on the high nickel side and nickel silver which contains a preponderance of copper, have excellent mechanical properties and can be used with a large number of chemicals, including chlorides and hydrochloric acid in moderate concentration, and with strong caustic solutions, as well.

Copper and Its Alloys

Copper and the copper base alloys, including the brasses, bronzes, copper-silicon alloy and aluminum bronze, all find wide use in the chemical industry because of their excellent performance in a variety of applications. Where resistance to wear to chemical attack is a requisite, some one of the materials in this group is frequently called upon to do service.

Aluminum, a much more recent member of the family of commercial metals, is one of the most widely used in the chemical industries. It is interesting that this material which resisted for so long a time the efforts to liberate it from its naturally occurring compound, and which is used under some conditions to enter into certain chemical reactions because of its strong reducing character, should be so nearly inert to such a range of chemicals.

The answer is to be found in the fact that on exposure to the air or to moisture the surface becomes coated with an extremely thin continuous film of aluminum oxide which adheres to and protects the underlying metal from further action. If this film is removed, it immediately forms again, provided oxygen and moisture are present.

As would be expected, aluminum does not withstand the action of those compounds which readily dissolve aluminum oxide, such as strong caustic solutions and some of the strong acids.

However, it is used in the production of concentrated nitric acid from atmospheric nitrogen and is approved for the shipment of that chemical by the Interstate Commerce Commission. This strongly oxidizing acid which attacks some metals so violently, builds up an oxide film on the aluminum which resists further action.

Action of Weak Acids

The salts of certain of the weak acids when dissolved in water have an alkaline reaction sufficiently strong to attack aluminum. It is possible, however, to render these compounds harmless to the metal by the additions of small amounts of compounds called inhibitors. Sodium silicate or potassium dichromate may be used for that purpose. Some of these salts such as sodium carbonate (soda ash) or trisodium phosphate, are commonly used as cleansing agents and water softeners. To make them suitable for use with aluminum equipment, it is necessary only to make certain that an inhibitor is present. Several manufacturers produce cleaning compounds of this type, which are used by dairies, breweries, food processing plants for cleaning aluminum equipment, and by metal working plants to clean the surface of the metal prior to painting.

For some purposes it is desirable to have even more protection than is afforded by the film of oxide which forms spontaneously in the air. This may be accomplished by treating the metal with certain chemical solutions. The patented "Alrok" finishes are examples of this type of protective treatment, and afford greatly improved resistance under some of the more corrosive conditions under which aluminum is used.

Even thicker and more resistant oxide coatings are produced electrolytically. In the patented "Alumilite" process, the aluminum as anode is immersed in a solution of sulfuric acid in water and a current of electricity is passed through the

metal into the bath. With proper control of the process, oxide coatings are formed of sufficient thickness to be measured with sensitive micrometers. To make these coatings most resistant they are given a sealing treatment which may at the same time add an inhibitor to further protect against chemical action. However, for the great majority of the applications of aluminum in the chemical field, no special treatment of the surface is required.

For many applications the use of aluminum is dictated by considerations other than, or in addition to, its resistance to the action of a wide range of chemicals, with the consequent satisfactory life of the equipment and low maintenance cost as well as insurance against failures which result in compensation cases.

The salts of aluminum are colorless, which makes it especially suited for use in the preparation and shipping of chemicals and, in the textile industries, in the processing of gums and resins for colorless varnishes and lacquers, and for the processing or storing of other products which are graded on the basis of color.

Use in Food Industries

Careful and thorough feeding experiments on both test animals and humans have demonstrated that aluminum compounds have no harmful physiological action. In fact, aluminum hydroxide is considered to be the most effective medication in the treatment of stomach ulcers today. Moreover, recent work has indicated that aluminum powder may prove to be effective in preventing silicosis and in the treatment of cases which have developed. The wide use of the metal in the preparation and processing of foods and beverages is completely justified by these studies.

In certain of the fermentation industries, aluminum is used because the products which result from any superficial attack of the metal have no harmful action in the organisms, whether yeasts or bacteria, or on the enzymes which they produce, upon which the chemical action depends.

Also, certain processes such as the decomposition of hydrogen peroxide or the hydrolysis of certain fats or oils are not accelerated by the presence of compounds of aluminum as is the case with compounds of some of the metals.

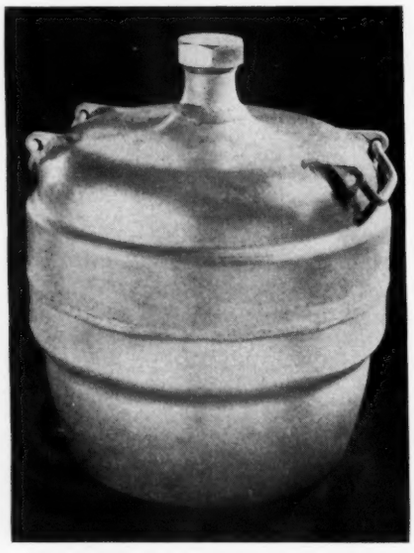
The resistance of the metal to the action of gaseous compounds of sulfur which prevail in industrial atmospheres and especially to hydrogen sulfide which is found in the vicinity of petroleum refineries and sulfur mines, leads not only to its use in certain of the processing equipment but for buildings and fences, for electrical conduit and ventilation ducts, for power and telephone lines, as well. While these uses of aluminum affect mainly the balance sheet from the standpoint of reduced maintenance costs, the possibilities of accident to maintenance crews and operators are correspondingly decreased.

Paul V. Faragher is a member of the central metallurgical staff of Aluminum Company of America and is responsible for the specifications under which the products of the Company are sold. He holds the degree of Bachelor of Arts from the University of Kansas and the degree of Doctor of Philosophy from M. I. T. From 1913 to '18 he was a member of the faculty of the University of Kansas, and after a year at Mellon Institute, he became affiliated with Aluminum Company of America.

Dr. Faragher is a member of the A. S. T. M. and is chairman of the non-ferrous metals division of the Standards Committee of the Society of Automotive Engineers.

The fact that aluminum does not spark when struck or abraded has led to its use in plants where inflammable or explosive materials are handled. Thus, the use of aluminum shovels or other handling equipment may immediately concern you, since the loss of material as a result of an explosion may easily be less serious than the injuries to the workmen in the plant.

The light weight of aluminum is usually of secondary importance in the choice of a metal for chemical uses, except from the standpoint of cost of the equipment and supporting structure. Commonly, the size of the apparatus and thickness of the metal is determined by other considerations so that about the same volume of metal is required, regardless of the choice. Since aluminum weighs only about one-third as much as the other metals which might be used, there are only one-third as many pounds to be paid for. This fact must always be considered, since metals are sold by weight.



An important use of aluminum is in the manufacture of drums and carboys.

There are, however, many places where the low specific gravity is of immediate importance. Aluminum shipping drums frequently weigh less than when made from other metals so that each trip from the plant, filled, and the return of the empty, is made at a lower cost in freight.

But, from the safety viewpoint, the reduction in fatigue from handling of lighter equipment, reduces the chances of accidents. Then, too, cases of hernia caused by lifting objects that are just too heavy for one man and yet which are not considered sufficient to require two, are not unheard of.

Then, too, the ease with which aluminum can be fabricated into the equipment which is required by the chemical industry is another advantage from the standpoint of cost. It should be stated that in using the term "aluminum," it has been intended to include the aluminum alloys which may be chosen because of their higher mechanical properties than those of the pure metal, several of which are fully equal to commercial aluminum in their resistance to chemical attack. For some few applications, aluminum of specially high purity is required but for most of the uses the commercially pure metal, or one of the alloys, is generally used.

Metallurgist Has Not Failed

In conclusion, it is interesting to note that the metallurgist has not failed in his task of supplying metals and alloys suitable for the chemical industry, nor the chemical and mechanical engineer in his use of those materials. Evidence of these facts is contained in the publication, "Accident Rates in the Chemical Industry," the report for 1937 being the latest which has come to the author's attention.

While the chemical industry is sometimes classed among the hazardous occupations, during that year you ranked ninth in frequency and 16th in severity, in a list of 30 industries. But, it is even more significant that injuries caused by "Harmful Substances" account for only 13.5 per cent. of the injuries in the chemical industries. In all probability, the majority of these were not caused by failure of the equipment, since it is stated that about 55 per cent. of all serious accidents were partly caused by wrong attitudes on the part of the employees, with "disregarding instructions" most frequently mentioned.

With the improvement in metals for use with corrosive chemicals, and the more intelligent choice among them, based on tests under actual conditions of plant operation, it is to be anticipated that there will be fewer and fewer cases in which reports will mention metal as even a contributing cause of an accident.

A near view of the chemical laboratories of the Indian Lac Research Institute Namkum, Rauchi, Bihar, India.

Newer Uses for Shellac

W. H. Gardner, Ph.D.
Polytechnic Institute of Brooklyn

THE number of new products which can be made from shellac is truly astonishing. One is reminded of Butler's story of "Pigs is Pigs" by the rapidity with which the various research laboratories are bringing to light new modifications of lac, and suggesting heretofore undreamed uses. Most of these materials are still in the development stage, but let us step through the "looking-glass" and see what the chemists have to show us. Immediately, we find new water-resistant finishes, rapid drying varnishes of all types, rapid setting resins for plastics, wax-like resins which can be blended with petroleum products, new sizes for paper and chemicals for organic synthesis.

Spirit Varnishes

Coatings from the new spirit varnishes (8) have all desirable properties of the older types of shellac products, including resilience, scratch-hardness and high gloss. In addition, they exhibit a marked resistance to water even before the films are completely dry. Their greater toughness extends their life against wear. Finishes can easily be restored with a thin coating of the same varnish like all spirit solutions of shellac. These new varnishes are crystal-clear solutions, giving films which are even more attractive than the coating in which we have been accustomed to take so much pride when our floors, trim, furniture and bowling alleys have been finished with shellac.

One group of these varnishes are prepared by incorporating a plasticizer and a small amount of cellulose nitrate in carefully clarified shellac solutions (8). Test panels coated in our laboratory with this type of varnish withstood several months of exterior exposure as compared with ordinary shellac finishes which failed within a few weeks under the same severe conditions. All of the products can be applied by spraying if proper pressures and equipment are employed (13) (15) (20).

Wax-lined metal containers have also been developed to protect the varnishes from contamination with iron through corrosion of the container. Varnishes packaged in this manner are free from any tendency to darken hard woods, such as oak (9).

Hard Lac

There is a new group of lacs known as hard lac (14). These resins are made by removing part or all of the softer fractions from shellac or seedlac (5) (25). Films from these resins do not whiten or blush as readily as ordinary lacs when placed in contact with water. They tend to crack and flake more readily however, upon complete evaporation of the solvent, and hence often require plasticizers. Both dewaxed orange and bleached grades have been prepared upon a large scale.

Baked films of these resins have unusual properties. They show excellent resistance to water and petroleum hydrocarbons, since baking can be carried out without the formation of bubbles and pin-holes. The adhesion is also improved by this process.

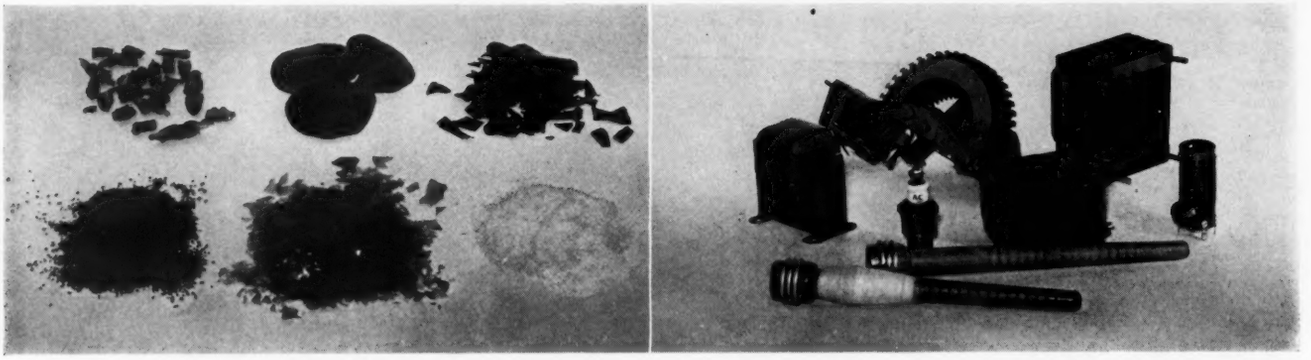
Special hard lacs for use by the electrical industries have been made by removing only 3 per cent. of the soft resin. These products resemble very closely ordinary lacs. They can be applied to copper, however, without any tendency to cause the metal to become green, since the constituents of high acid number have been removed in their preparation.

Hard lacs have also very desirable properties for such uses as French polishes (17), as cold tops for photo-engraving, as adhesives for gold stamping, and as coatings for metal pipes used to transmit lubricating oils. Many other applications will undoubtedly be found as soon as consumers become acquainted with these resins.

Oil Varnish Resins

Another very interesting recent development is the preparation of lac-oil varnishes (2) (3). Ordinarily, shellac is not soluble in drying oils. These resins are made by first dissolving shellac in hot fatty acids. The fatty acids react with the alcohol groups of the various constituents of lac to form esters. The excess of fatty acids is then combined with glycerine or mono-glycerides to produce products which can be cooked with any amount of drying oil.

These varnishes compare favorably with ordinary drying oil varnishes. Their films have excellent gloss, and when baked resist both water and gasolene. They can be thinned with mineral spirits and give rapid drying finishes with cobalt driers, which are superior to ester gum or rosin varnishes prepared under the same cooking conditions. Varnishes can be stored for months in ordinary containers with no tendency to form a skin



Left, different types of lac; right, mechanical objects where shellac is employed as a varnish.

upon the surface. They appear to be particularly suitable for certain types of electrical insulation and for flexible finishes where resistance to mineral oils is desired. Films of these varnishes also adhere well to vulcanized rubber surfaces, suggesting a whole field of new applications.

Varnishes containing small quantities of tung (China wood) oil are particularly resistant to weathering. This recalls to mind the almost forgotten art of the use of lac in carriage varnishes where lac was employed for years as the resin in highly leaded japans (1).

Products made with mono-glycerides and those having an acid number greater than 40 possess emulsifying properties when dispersed in dilute ammonium hydroxide solutions. Polymerized resins made with castor oil have been suggested as ideal agents for emulsifying cellulose nitrate. Those high in shellac content are soluble in alcohols. Many of these resins are also ideal constituents for cellulose ester lacquers of various types.

Water-resistant, flexible oil varnishes have also been reported to have been made from the soft lac (23), which is a by-product in the manufacture of hard lacs. Films of these varnishes when baked at 190° F. are recommended as suitable for wood, paper and metals.

Air drying and baking types of varnishes which are suitable for general use in the manufacture of electrical insulation have been prepared by allowing mixtures of shellac, glycerine, fatty acids and phthalic anhydride to react (7). It is claimed that the dried or cured films of these varnishes are unusually tough and elastic. The films resist both oil and water, which appears to be a general characteristic of oil varnishes containing lac, and they retain their desirable properties for long periods of time.

Shellac Esters

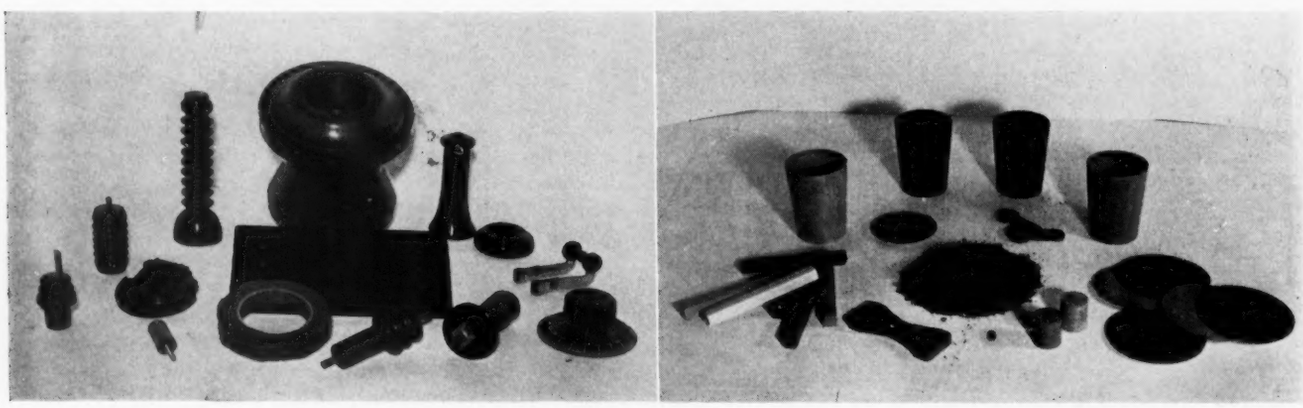
A whole line of new resins of widely different properties can be made by reacting shellac with various fatty acids, their mixtures or with alcohols. Many of these resins have entirely different properties from those of shellac (14) (26).

The acetic, butyric, caprylic and lauric esters and the alkyl esters are semi-solid materials. They can be made so that they are completely soluble in toluene, a non-solvent for shellac. The caprylic esters are insoluble in both methyl and ethyl alcohols. Lauric esters show a toughness not exhibited by other materials of this group. The lauric esters can also be thinned when hot with petroleum spirits. Stearic acid esters in contrast to the others are soluble in drying oils, and petroleum solvents. They are waxy, non-tacky resins and are compatible with petroleum wax. Stearic esters also form emulsions with aqueous ammonia. Purified oleic esters exhibit the very interesting property of giving films which dry upon long exposure to air or upon baking. This may prove of importance, since it suggests a new means for preparing drying oil types of varnishes from semi-drying oils. The linseed fatty acid esters also exhibit drying properties. Uses such as raw materials for high solid content cellulose nitrate lacquers, as ingredients for various types of polishes and sizes, as materials for treating textiles, and as a new raw material for manufacturing linoleum and cements have been suggested for these products.

Alkyl esters of shellac have also been advanced as ingredients for lacquers of high solid content (10). Their semi-liquid, non-drying characteristics cause them to behave both as a resin and as a plasticizer when used in large proportions in combination with cellulose nitrate (22). A new type of lacquer formulation can thus be obtained with these materials, since they do not affect the original toughness and hardness of the cellulose ester as do most other types of plasticizers.

The alkyl esters are prepared by allowing shellac to react with an alcohol in the presence of a catalyst. Products of relatively low acid number can be made in this manner. Such products, like certain special shellac solutions manufactured for the lacquer trade, impart excellent gloss and adhesion to lacquer films containing

Below, left, various shellac moldings the Indian Government is assembling; right, experimental moldings at Polytechnic Institute made from shellac molding powders.



them. They are soluble in practically all the lacquer solvents and diluents except the petroleum thinners. They are also compatible with most of the resins used in these coatings in all proportions.

Lacquer does not represent by any means the only use for which these materials may be suitable. Their general properties lead one to predict that further study will show that they may be valuable ingredients in a variety of other compositions, as for instance inks, and paper or leather coatings.

Plastics

There are in addition innumerable other ways in which shellac can be modified chemically, since it will react under proper conditions with a very wide variety of substances (11) (18). It will combine for example, with formaldehyde, with phenols and with ureas; a group of chemicals used in the manufacture of thermosetting synthetic resins. Hence, shellac can be used in preparing a whole series of new synthetic resins of these types (16) (24). Many of these resins are suitable for both compression and injection molding.

The properties of these resins depend upon the relative proportions of the ingredients used in their preparation, and the manner in which they are combined. Resins of the phenolic type, for example, when high in lac have many of the advantages of shellac. Most outstanding of these advantages are their resistance to carbonization from an electric arc. Such resins are being used for electrical insulators where intermediate voltages are employed in operation. Resins high in phenol and formaldehyde like the phenolic resins show a rapid rate of hardening. Articles molded from these resins resist distortion at elevated temperatures.

Molding powders made from polymerized shellac (12), from high phenolic-lac resins, from shellac-formals, and from shellac-urea-formaldehyde resins (24) can be pressed at the same elevated temperatures as generally used for thermosetting resins. This is several degrees higher than temperatures used for unmodified shellac compositions, and for thermoplastic resins in general. Many of these chemically modified types can be ejected from the molds while still hot. This eliminates the use of cooling water and several press accessories, and greatly speeds up production. Molding powders can be prepared in a wide variety of colors and additional decorative effects can be obtained by blending the varied colored powders used in the molding, just as is generally done with the present types of thermosetting plastic powders.

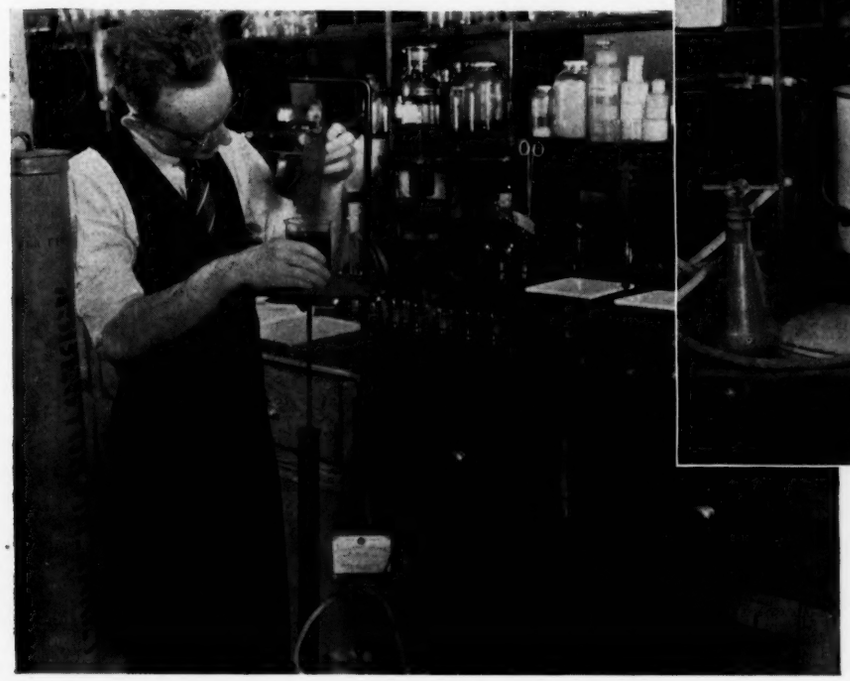
The more thermoplastic types of lac compositions can be molded at a relatively high rate of production in the newer types and designs of injection molding equipment (19). These compositions have an advantage in price when the cost of lac is as low as it has been for the past few years.

Shellac is compatible with ethyl cellulose in all proportions. Combinations of these two materials make excellent compositions for many plastic uses (24). Lac-ethyl cellulose coatings are ideal for the new aluminum type of phonograph records.

Aqueous Varnishes

Aqueous solutions of lac find in general a wide variety of uses. They are employed, for example, in the preparation of wax emulsions, in leather dressings, as food glazes, in inks, as paper glazes, and as bonding and impregnating agents. Considerable study is being given to the production of modified lacs which will produce flexible films from such types of varnishes. Films from varnishes made by dissolving unmodified shellac in aqueous solutions of alkalies and alkaline salts are too brittle for some uses. They are more brittle than those obtained from alcoholic solutions.

A fairly large number of different types of modified lac can be prepared for the above purpose. Many of these have very interesting individual properties. Some of the coatings obtained retain their flexi-



Right, testing the flow of new lac resins at the Polytechnic Institute of Brooklyn.

Another view showing the testing of new shellac resin varnishes.

bility for long periods, even when baked. Baking again has the advantage of developing a considerable degree of water resistance not had before the films are so treated. This is especially true of ammonium hydroxide solutions of some of these resins. Contrary to what might be expected, considerable amounts of ammonia appear to be retained during the drying and baking processes. Possibly the ammonium salts of the resins are converted to amides during the heating.

Interesting properties have also been imparted to lacs by dissolving them in sodium bisulfite solutions (6). These solutions may be pigmented for use as aqueous paints. Such paints dry to the touch in half an hour or less. It is claimed that films can be scrubbed with a brush and soap after they have dried for a few days. They dry to give a matt effect but can be polished to a pleasing eggshell finish.

Lac Acids

Shellac may also be looked upon as a potential source for certain types of new chemicals, especially the polyhydroxy-acids, such as aleuritic acid, shellolic acid and kerrolic acid. These acids are comparatively little known to organic chemists. They would be too expensive to synthesize for commercial use, but can be readily obtained from saponified lac (21) (27). They offer many possibilities for the synthesis of a large number of new compounds, including pharmaceuticals and medicinals.

Thus, we have seen that shellac is truly an even more remarkable product than we might have expected. We come back from our tour of the laboratories nearly as dazed as "Alice" was when she stepped back into normal life. It is not unreasonable therefore to predict that the time is not distant when one will need only to ascertain what group of properties he requires in a lac, and the shellac chemist will be able to produce for him that type of resin which he most desires.

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* A limited number of reprints of these articles are available to seriously interested persons. These may be obtained by addressing the Secretary of the Shellac Research Bureau of the Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn, New York.

The Bookshelf

Steam Boiler Performance, by W. G. Beaver, McKay, Phila., 213 pp., $2.00. One of those truly big, little books worth their weight in gold for the rich dividends of practical fact they yield.

General Chemistry, by T. P. McCutcheon, Harry Seltz, J. C. Warner, Van Nostrand, N. Y., 685 pp., $3.75. A very thorough revision of this well known text has produced outstanding results—in its field the work is without a peer.

The New Deal Goose Step, by Carl H. Mote, Daniel Ryerson, Inc., N. Y., 260 pp., $2.50. Chapter and verse of the anti-administration jeremiad well packed with "background" and abounding in quotable bits.

Early Fire-Making, by Warren N. Watson—privately printed, 75 pp. Fire being the first chemical discovery, there are peculiar appropriateners in Mr. Watson's hobby of collecting early fire-making implements—a hobby which has resulted in this scholarly yet readable little monograph.

Problems in Industrial Purchasing, by Howard T. Lewis, McGraw-Hill, N. Y., 649 pp., $5.50. Problem study, like case study in the law schools, is an ingenious method of vivid presentation, and while some of the hypothetical cases presented seem a little fanciful and sometimes askew in technical details, nevertheless this book gives the clearest conception of the tasks and responsibilities of the PA that has yet appeared.

The Invisible Tariff, by Percy W. Bidwell, Council on Foreign Relations, N. Y., 286 pp., $2.50. From anti-dumping embargoes and plant quarantines to German and Japanese boycotts and "buy American" campaigns the extra legal means of protection are discussed with a bias towards international free trade.

An Outline of Organic Chemistry, by Ed. F. Degering, R. E. Nelson, and J. R. Harrod. Barnes & Noble, N. Y., 325 pp. Cloth $2.25, paper $1.25. An epitome, a glorified set of lecture notes, a "crib"—from any point of view a good job done with inclusive and scrupulous care.

Science and Social Change, by Jesse E. Thornton, The Brookings Inst., 577 pp., $3.00. A compilation, and a good one, dealing not with popularizations of technical advance, but with what our scientific progress means and what we are going to do with and about it.

Federal Encroachment on Industry, by Thomas Marshall, Christopher Pub. House, Boston, 128 pp., $1.50. An eminent attorney sets forth clearly the case against the trends towards centralization of power, the growth of a government of men rather than of laws—a fruitful work, clear, simple, well reasoned, and fully documented—deserves wide reading by businessmen.

Minerals, Metals, and Gems, by A. Hyatt Verrill, L. C. Page & Co., Boston, 293 pp., $3.00. Popularly written, this book coaxes one to ride the mineralogist's hobby-horse, and the quite complete index of minerals and gems gives this attractive work a substantial value.

Standard Chemical & Technical Dictionary, edited by H. Bennett; Chemical Publishing Co., Inc., N. Y. C.; 638 pp., $10. With over 25,000 definitions, this up-to-date work is ideally suited for the use of both technical and non-technical men; volume contains many technical terms not found in other chemical dictionaries.

Lange's Handbook of Chemistry, compiled by Dr. Norbert Herbert Lange, with the collaboration of Gordon M. Forker and Prof. Richard S. Burington; Handbook Publishers, Inc., Sandusky, O.; 1800 pp. This, the third revision of Lange's widely-known work, contains all that was included in the previous edition, brought up to date, and several valuable new features. The latter include: tables of properties of various photographic film emulsions and of comparative photographic emulsion speed ratings; dimensional formulas; symbols of thermo- and physico-chemical quantities; properties of cast metals. The Handbook is an indispensable source of accurate information for anyone engaged in the fields of applied science.

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Left: National's unique sampling tube that penetrates, from top to bottom, and draws a completely representative test sample from each Phthalic Anhydride container.

Above: A laboratory control station where each production stage—from raw material to finished product—is checked.

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From raw materials to the individual deliveries into your plant, National's Phthalic Anhydride is a laboratory controlled product, the result of strict adherence to scientifically fixed and rigid standards that assure you of uniform quality and the highest purity.

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CHICAGO . . . . 357 W. Erie St.	GREENSBORO . Jefferson Standard Bldg.	PORTLAND, ORE. . . 646 N. Thompson St.
PHILADELPHIA . . 200-204 S. Front St.	ATLANTA . . . . 140 Peachtree St.	TORONTO . . 137-145 Wellington St., W.

BRANCHES AND DISTRIBUTORS THROUGHOUT THE WORLD

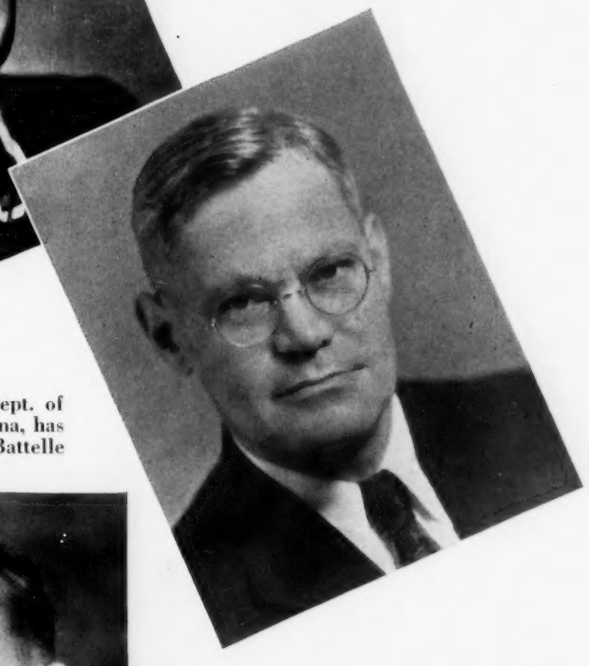
South American Winners of Cabot Awards Honored Here: José Santos Gollan, left, Sunday editor of La Prensa of Buenos Aires, and Dr. Luis Miro Quesada, right, president of the directors of El Comercio of Lima, who formally received the prizes for journalistic service in fostering international good-will in the Americas, are shown at luncheon at the Ritz-Carlton, N. Y. City. In the center is Dr. Godfrey Lowell Cabot, donor of the awards.

Times Wide World.

Wins Gibbs Medal: Left, Dr. Vladimir N. Ipatieff, internationally known Russian chemist who came to the U. S. in '31, awarded the Willard Gibbs Medal of the Chicago Section of the A. C. S. Dr. Ipatieff, cited as "occupying a place of the first order in modern chemistry," is professor at Northwestern U. and director of research of Universal Oil Products.

Shares Nobel Award in Chemistry: Above: Prof. Leopold Ruzicka of the Federal Institute of Technology at Zurich, Switzerland, who divides this year's Nobel Prize in chemistry with Prof. Adolph Butenandt of Berlin. Both Professor Ruzicka and Professor Butenandt are internationally known for their work on the sex hormones. This photo of Professor Ruzicka was made in 1935 when he attended a meeting of the A. C. S. at San Francisco.

Times Wide World.



Edward Mack, Jr., former head of the Dept. of Chemistry at the University of North Carolina, has been added to the supervisory staff of Battelle Memorial Institute.

Extreme left, Ralph S. MacPherran, genial Chief Chemist of Allis-Chalmers Mfg. Company for many years and who only recently retired from active service because of a heart ailment, died Nov. 13 at Duluth. Left, Harold J. Stein, Research Engineer of the Manufacturing Department who has been appointed Director of Research, Chemistry and Metallurgy, now bringing all these activities under one head.

Chemical Engineers at Providence

The "Candid Camera" at the 32nd annual meeting of the A.I.Ch.E., held at Providence, R. I., Nov. 15-17. Left, His Excellency, Governor William H. Vanderbilt, delivering a cordial welcome to the members of the Institute. See also page 694 for additional pictures of the group.

Above, Dr. Webster N. Jones, president of the A.I.Ch.E., and Arthur C. Schubring, Michigan Alkali; Left, Dr. L. W. Bass, Mellon Institute, and Fred C. Mitchell, Du Pont; Right, A. A. Backus, U. S. Industrial Alcohol, and C. R. Downs, New York consultant (Weiss & Downs).

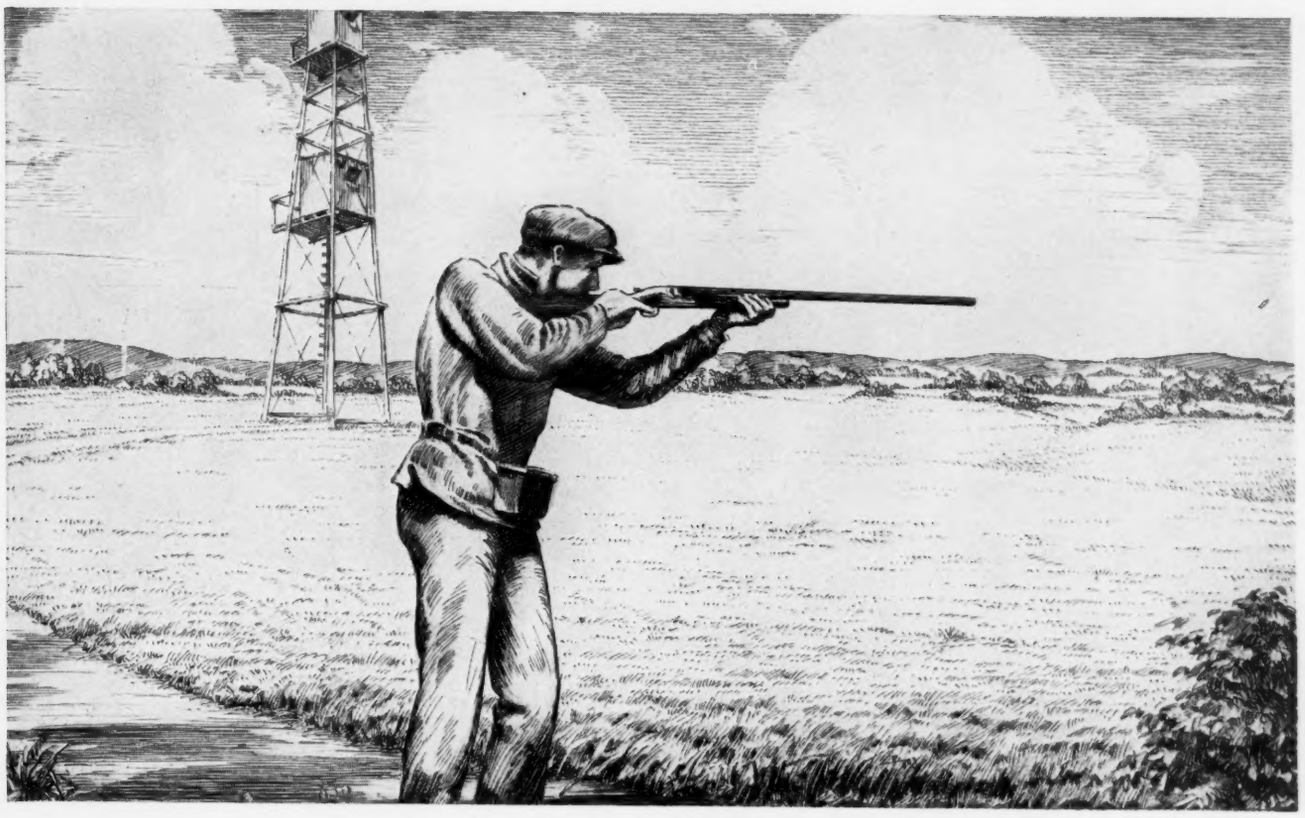
Maurice A. Knight, Jr., and Mrs. Knight. He is connected with Maurice A. Knight, Akron manufacturer of stoneware equipment.

Below, Thomas H. Chilton, Du Pont.

Below, W. L. Morgan who spoke on "The Technical Industries of Rhode Island" at the opening session. To his right, Dr. Martin H. Ittner, Colgate-Palmolive-Peet.

Below, left to right, John P. Hubbell, partner in the New York consulting firm of Singmaster & Breyer, and Prof. J. J. Morgan of Columbia University.

INTERESTING USES OF ALKALIES



A Vital Step In The Manufacture Of Smokeless Powder

Smokeless nitrocellulose powder has largely replaced the black potassium nitrate powders for shotgun shells and rifle cartridges. In the preparation of nitrocellulose for this purpose, caustic soda plays a vital part. Before the cellulose can be converted into its nitro compound the fats and oils from the raw cotton are removed by the use of caustic soda in the ratio of about 2% to the weight of the raw cotton.

Because the function of alkalies in manufacturing industries is seldom recognized in the finished product, the average layman has little conception of the tremendous tonnage of caustic soda, soda ash, liquid chlorine and bicarbonate of soda used in manufacturing such important commodities as chemicals, paper, soap, textiles, glass, foods and drugs. Neither does he realize how numerous and how varied are the uses made of these alkalies. Some of the more or less obscure and minor uses have been depicted in this series of advertisements here concluded.

We have taken this novel way of bringing the name COLUMBIA to the attention of executives, technicians and purchasing heads with the hope that the high quality of COLUMBIA products and the dependability of COLUMBIA service will be remembered through the year and years that lie ahead.

We shall be glad to send you free of charge a large size reproduction of above illustration, "The Skeet Shooter" suitable for framing, if requested on business letterhead and naming magazine in which you saw this advertisement.

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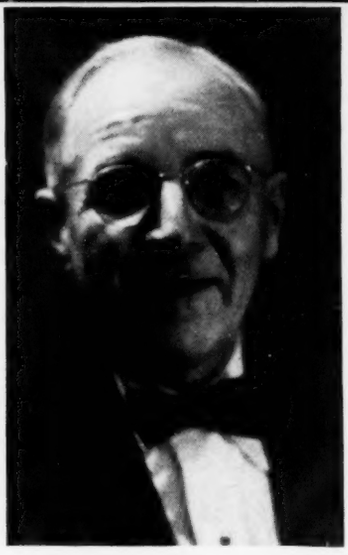
Above, "The Players" of Providence, one of the oldest amateur theatrical organizations in the country, presenting "The Vaudeville Show of the Ages" on Thursday evening in the ballroom of the Providence-Biltmore. Left, Prof. John B. Phillips, McGill University. Right, top, His Honor, Mayor John F. Collins of Providence, reviewing the history of that city for the "Chem. Engineers."



David C. Scott, Sr., Henry L. Scott Co., Providence, R. I.

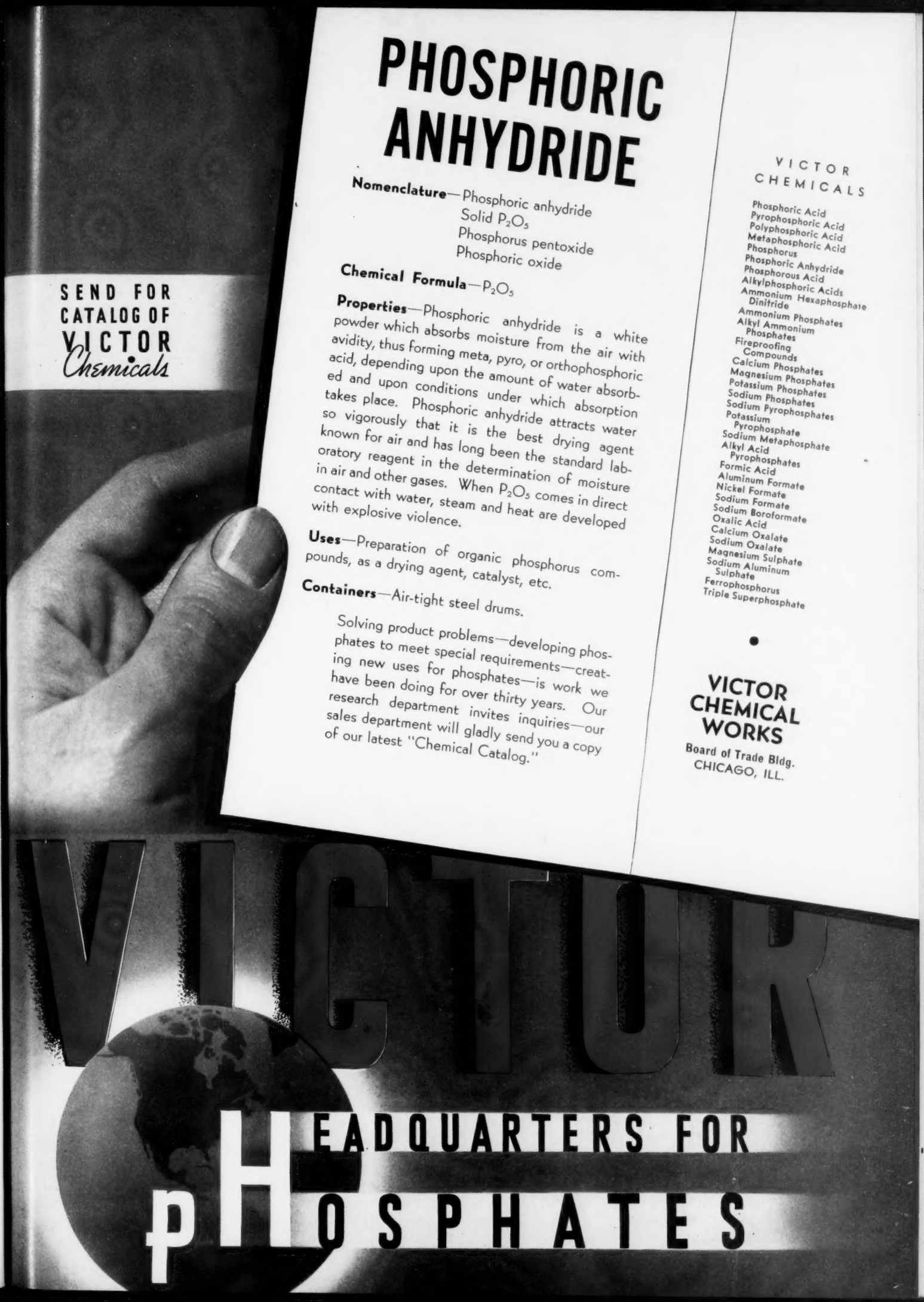
Left, J. R. Bailey, Du Pont, speaking on "Work Simplification in Chemical Industries."

Left, H. J. Masson, Professor of Chemical Engineering, New York University.

Below, A. E. Marshall, President of Rumford Chemical, talking with Earl P. Stevenson, President of Arthur D. Little, Inc., and J. L. Bennett, Hercules Powder.

Left, T. Stephen Crawford, Professor of Chemical Engineering and head of department, Rhode Island State College. Below "Count Rumford" makes a second return to Providence. The "Count" was again portrayed by Theodore Sweet, Rumford Chemical Works, who had the part during the 80th birthday party of Rumford last summer. The "Count" is being interviewed while Prof. Donald B. Keyes, of Illinois, smiles at the proceedings.

At the right, Kenneth H. Klipstein, manager of Calco's Development Department; below, H. O. Chute, New York consultant.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PHOSPHORIC ANHYDRIDE
Nomenclature—Phosphoric anhydride
Solid P_2O_5
Phosphorus pentoxide
Phosphoric oxide
Chemical Formula—P_2O_5
Properties—Phosphoric anhydride is a white powder which absorbs moisture from the air with avidity, thus forming meta, pyro, or orthophosphoric acid, depending upon the amount of water absorbed and upon conditions under which absorption takes place. Phosphoric anhydride attracts water so vigorously that it is the best drying agent known for air and has long been the standard laboratory reagent in the determination of moisture in air and other gases. When P_2O_5 comes in direct contact with water, steam and heat are developed with explosive violence.
Uses—Preparation of organic phosphorus compounds, as a drying agent, catalyst, etc.
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Calcium Phosphates
Magnesium Phosphates
Potassium Phosphates
Sodium Phosphates
Sodium Pyrophosphates
Potassium Pyrophosphate
Sodium Metaphosphate
Alkyl Acid Pyrophosphates
Formic Acid
Aluminum Formate
Nickel Formate
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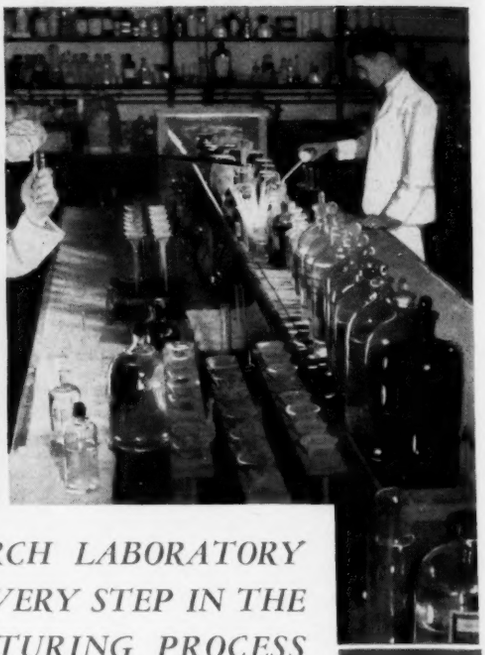

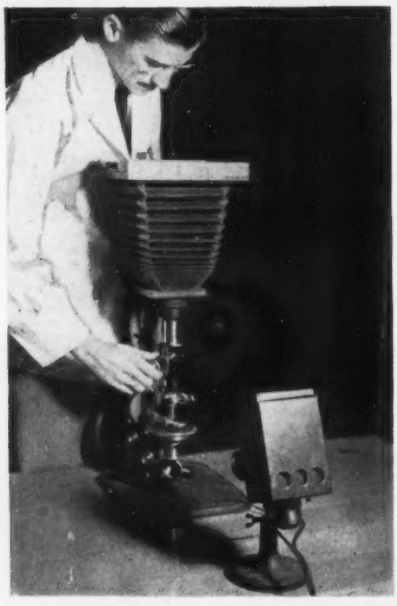

CONSTANT RESEARCH LABORATORY ANALYSES CONTROL EVERY STEP IN THE DIAMOND MANUFACTURING PROCESS

Throughout the Diamond manufacturing processes, a program of sampling and testing, repeated at stated intervals, is your constant assurance of alkalies that exactly meet your specifications, day after day, year after year. The illustrations on this page show some of the equipment and technique used in making these investigations. To secure the accurate data needed for exact control of every step, we use the fine instruments and precision methods generally reserved for the Research laboratory.

The end result, from your standpoint, is strict adherence to quality specifications and definite assurance of prompt deliveries, due to the smooth functioning of our precision manufacturing processes.

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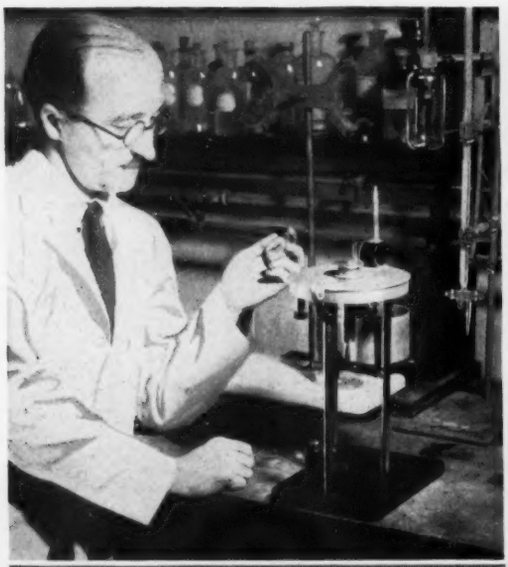
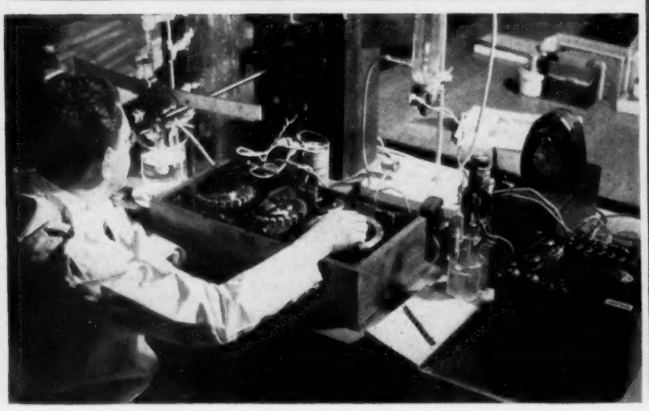
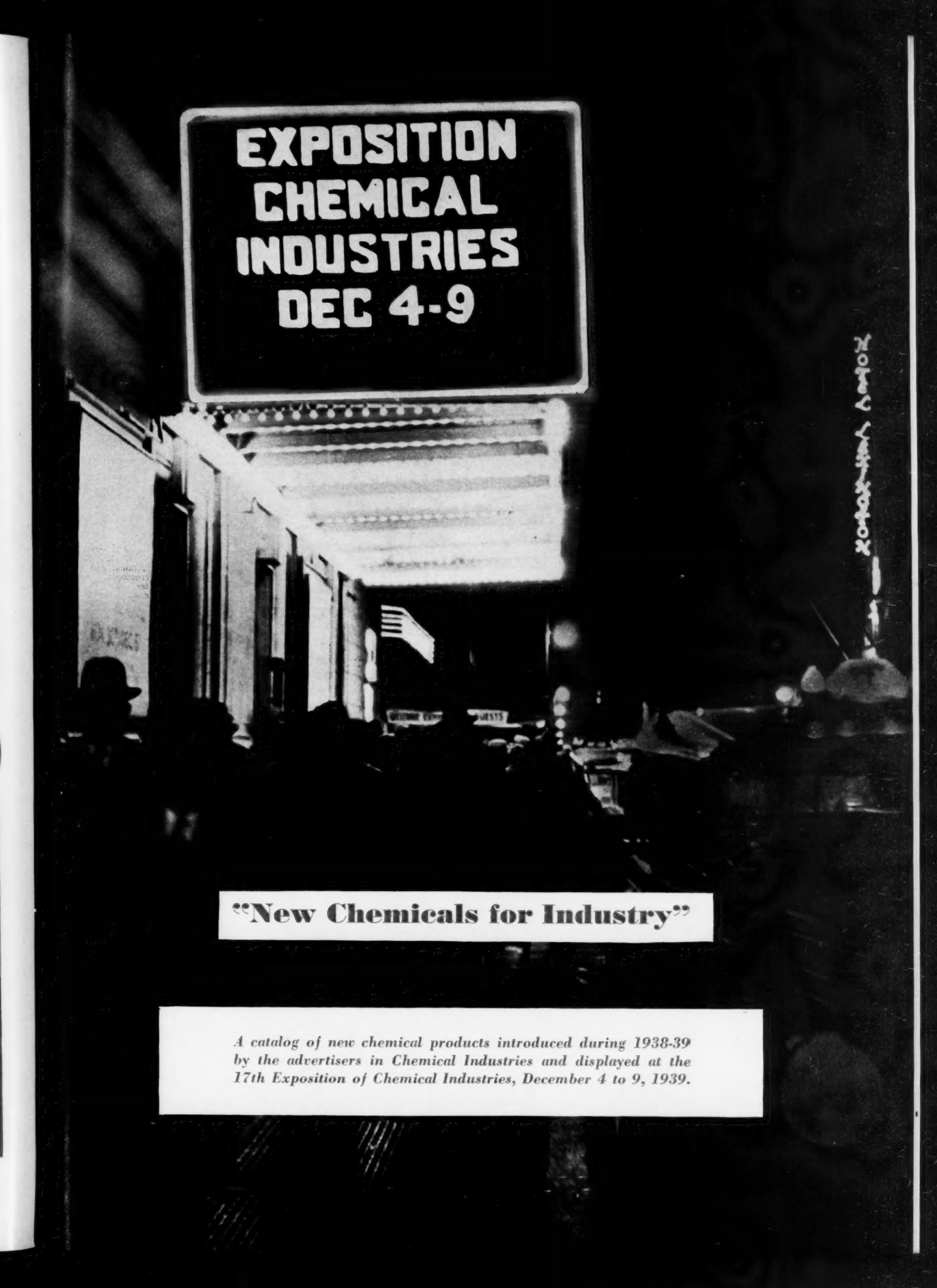




To make certain that Diamond products conform to specifications, precise tests are made at each step in manufacture. The equipment and laboratories used for some of the tests are shown in these views.



"New Chemicals for Industry"

A catalog of new chemical products introduced during 1938-39 by the advertisers in Chemical Industries and displayed at the 17th Exposition of Chemical Industries, December 4 to 9, 1939.

New Chemicals for Industry

A catalog of chemical products introduced during 1938-1939 by the advertisers in CHEMICAL INDUSTRIES and displayed at the 17th Exposition of Chemical Industries, December 4 to 9, 1939.

ACETONYL ACETONE

$CH_3COCH_2CH_2COCH_3$. Colorless, water-soluble liquid, B.P. 191.4° C. Good solvent for cellulose acetate; xylene nitrocellulose dilution ratio, 1.8. Even when present to the extent of a small percentage it reduces viscosity of nitrocellulose and "Vinylite" resin solutions—important factor in roll-coating inks. A 1,4-diketone, it condenses with reagents to form ring compounds which are derivatives of furane, thiophene, and pyrrole, providing a simple method for passing from open-chain to cyclic compounds. Found to have a definite tanning effect on hides and skins. Carbide and Carbon Chemicals Corp.

ACETYL ISOBUTYRYL

A higher homolog of diacetyl, but less volatile than the latter. Very penetrating odor. Uses—mfr. fruit and butter flavors. Fairmount Chemical Co., Inc.

ACETYL PROPIONYL

A higher homolog of diacetyl, but less volatile than the latter. Uses—mfr. butter and fruit flavors. Fairmount Chemical Co., Inc.

ACID n-CAPROIC

$CH_3CH_2CH_2CH_2CH_2COOH$. Liquid of characteristic odor, B.P. 203.1° C. Slightly sol. in water. Esters are important in manufacture of flavors, perfumes, and essential oils. Potential source of hexyl groups for the synthesis of varnish driers, resins, rubber chemicals, and certain medicinals. Carbide and Carbon Chemicals Corp.

ACID 2-ETHYLBUTYRIC

$(C_2H_5)_2CHCOOH$. Also known as diethyl acetic acid. Water-white, high-boiling (194.0° C.) liquid which resembles butyric acid in most properties except that its odor is less pronounced and water solubility limited. Forms esters less water-soluble than corresponding butyrates and hence are more suitable as plasticizers. Readily halogenated to form intermediates in making certain interesting drugs, dyestuffs, and special chemicals. Carbide and Carbon Chemicals Corp.

ACID 2-ETHYLHEXOIC

$CH_3(CH_2)_3CH(C_2H_5)COOH$. Mild-odored octanoic acid. Has a comparatively high B.P. 226.9° C. Properties of its metallic salts indicate possibilities as varnish driers because they are stable, hydrocarbon-soluble, high in metallic content, and light in color. Products of high molecular weight, such as its esters, form the basis of other compounds having detergent, emulsifying, or plasticizing properties worth investigating. Carbide and Carbon Chemicals Corp.

ACID ORTHOCHLOROBENZOIC

$C_7H_5O_2Cl$. White crystalline solid. M. P., about 138° C. Uses—dye intermediate; for chemical synthesis. Cont.—100 lb. slack bbls. Heyden Chem Corp.

ACID PARACHLOROBENZOIC

$C_7H_5O_2Cl$. White, semi-crystalline solid. M. P. 284° C. Uses—preservative, germicide, fungicide; dye intermediate, in chemical synthesis. Cont.—100 lb. slack bbls. Heyden Chem. Corp.

ACID PHOSPHORIC, FEED GRADE

Conc., 68%. Special grade for treating grass and legume ensilage, preserving the proteins and vitamins of the green fodders Makes possible the simple, economical preservation of green fodders, improving milk color and flavor during the winter. Virginia-Carolina Chemical Corp.

ACID PHOSPHORIC, INHIBITED (Tech.)

Conc., 75%. Contains an inhibitor reducing the corrosive rate on ferrous alloys in excess of 98%, making possible its use for a variety of new uses. Inhibited acid, as treated, is nontoxic, and otherwise not affected by the presence of the small amount of inhibitor. Virginia-Carolina Chemical Corp.

ACID PICROLONIC

1-p-nitrophenyl-3-methyl-4-isonitropyrazolone-5. Reagent for identification of alkaloids and amines, of highest purity available. Gesing Chem. Co.

ACIDS PHOSPHINIC

$RPHO_2H$. Kerosene phosphinic acid contains a phosphorus-to-carbon linkage and is derived from the hydrocarbons contained in kerosene. It is a brittle, glassy solid of low melting point, soluble in most common organic oxygenated solvents. Benzene phosphinic acid has a characteristic phosphine-like odor. They have possible application as insecticides and fungicides as well as other applications characteristic of organic phosphorus compounds. Victor Chem. Works.

ACID SULFAMIC

M. P. 205° C. (dec.). Soluble to extent of 21.3 g. per 100 gs. water at 20° C. Strong monobasic acid with unique chemical and physical characteristics. Non-hygroscopic, non-volatile; all salts readily sol. water. Uses—nitrite removal following diazotization reactions; leather tanning; standard in acidimetry; electrorefining of metals; weed killer; organic syntheses. Derivatives—Ammonium sulfamate, a white, crystalline solid, M. P. 131° C; extremely sol. water. E. I. du Pont de Nemours and Co. **(Inc.)**

CHEMICAL INDUSTRIES

522 Fifth Avenue, New York, N. Y.

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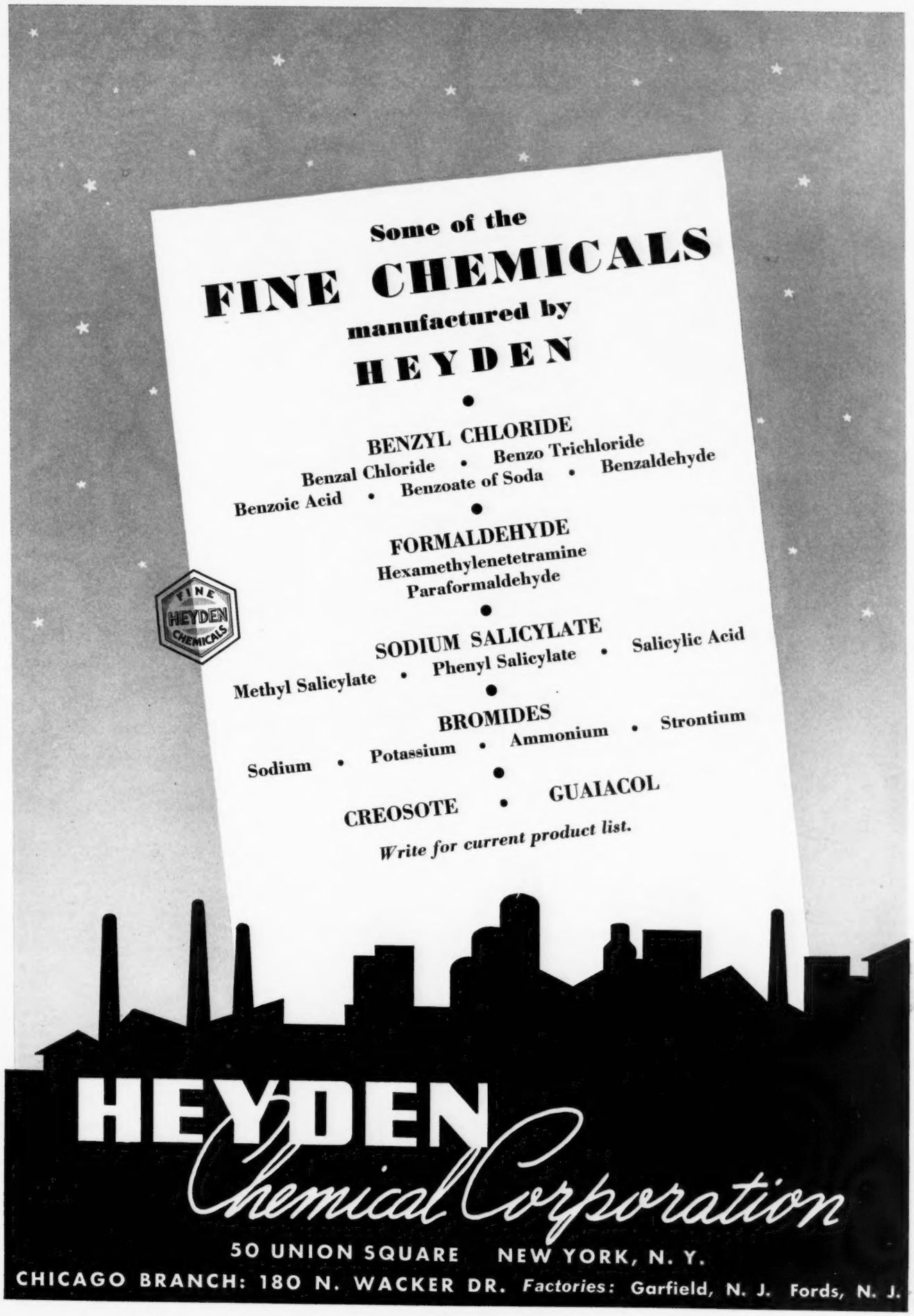
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AERO AC 50

Diorthotolyl guanidine zinc chloride. M.W. 614.3. White, odorless, amorphous powder. M.P. 76-82° C. Sp. Gr., 1.28. Insol. water; sol. alcohol, acetone, benzol. Good stability on storage. Use—delayed action secondary accelerator or activator with the thiazole type of accelerators, in mfr. of rubber products. American Cyanamid & Chem. Corp.

AEROCARB A and B

Cyanide salt bath combination, for treating steel parts. "Aerocarb A" is a gray material, prepared in 2-oz. briquettes; "Aerocarb B," a white granular compound (M.P. 1150-1300° F.). Stable in closed containers; release HCN with acids, but inert to alkalies and solvents. Used jointly as a fused salt bath for case-hardening ferrous objects—which are readily rinsed clean with water after treatment. American Cyanamid & Chem. Corp.

ALBUMEN, EGG (Refined)

High purity, water-soluble egg albumen. Available in packages of ¼, 1, and 5 lbs. Harris-Seybold-Potter Co.

ALFRAMINE DCA

A sulfonation product of a high molecular aldehyde condensate of the aliphatic series. In combination with other less active chemical compounds, Alframine DCA presents a yellowish white, medium heavy powder, with which its colloidal character is completely harmonious. It does not contain any filler, whatsoever. The specific gravity of the powder amounts to 0.7-0.8 which means that one volume of this powder has ¾ the weight of the same volume of water. Uses—textile, fur, leather, paper, electric plating and metal, bottle washing, laundry, rug cleaning industries, and for household use. Michel Export Company.

ALIZARINE BLUE BLACK BA

When dyed on wool by the top chrome method, yields blue-black shades of very good all-round fastness. Also applied by the bottom chrome or the ortho method, the latter being particularly desirable for producing light, mode shades of grey, etc. Color possesses very good fastness to light, carbonizing and rubbing and good fastness to fulling, washing and perspiration. Under artificial light its shade becomes somewhat redder. National Aniline & Chemical Co., Inc.

ALKYL ACID PYROPHOSPHATES

$R_2H_2P_2O_7$. These are viscous liquids in which "R" can be methyl, ethyl, propyl, butyl, or amyl. The compounds are soluble in water with reversion to the orthophosphates, the rate becoming rapid in hot solutions. They are all soluble in alcohol, and the propyl, butyl and amyl are completely soluble in vegetable oils (e.g., linseed). Due to the recent increased interest in pyrophosphates, these products should find use in several different fields of application. Victor Chem. Works.

ALLYL TIGLATE

Used in imitation flavors, coming very close to a true pineapple flavor. Should also be useful in honey flavors, as well as in other fruit flavors. Fairmount Chem. Co., Inc.

ALUMINUM FORMATE, BASIC

$Al(COOH)_2OH$. White, amorphous powder with faint odor of formic acid. Readily soluble in water at 30° C to give as high as 40% solutions. The pH of its solution varies from 4.2 to 3.8 at concentrations from 1% to 30%. Finds use as a waterproofing agent either alone or in emulsions. Other applications are as a mordant and astringent. Victor Chem. Works.

2-AMINO-1-BUTANOL

$CH_3CH_2CH(NH_2)CH_2OH$. Isomeric with 2-amino-2-methyl-1-propanol. Its properties and chemical reactions are similar except that it is slightly higher boiling. Commercial Solvents Corp.

2-AMINO-2-ETHYL-1,3-PROPANEDIOL

$CH_2OHC(C_2H_5)(NH_2)CH_2OH$. The chemical properties of this compound are very similar to those of the corresponding methyl derivative, which has just been described. Due to the low melting point of 2-amino-2-ethyl-1,3-propanediol, it may, even when of high purity, be a viscous liquid rather than a solid at room temperature. Commercial Solvents Corp.

2-AMINO-2-METHYL-1-PROPANOL

$CH_3C(NH_2)(CH_3)CH_2OH$. Colorless, moderately viscous liquid, sol. water and in practically all organic solvents. Its chemical properties are largely determined by the presence of the amino and hydroxy groups in the molecule. Forms stable salts with strong acids and, with higher fatty acids such as oleic and stearic, forms soaps very useful in the preparation of oil-in-water emulsions. Commercial Solvents Corp.

2-AMINO-2-METHYL-1,3-PROPANEDIOL

$CH_2OHC(CH_3)(NH_2)(CH_2OH)$. Colorless odorless solid, sol. water and alcohols. Sol. in alcohols decreases as the molecular weight of the alcohol increases. Its soaps are valuable as emulsifying agents and its use as a CO_2 absorbent is also indicated. Commercial Solvents Corp.

AMMONIATED PHOSPHORATED CASTOR OIL

Viscous, colored oil containing 4% combined P_2O_5 and 0.45% ammonia. It has adhesive properties; one suggested use is as a fireproofed air-filter impregnating agent. Victor Chem. Works.

AMMONIUM ALKYL PHOSPHATES

NH_4RHPO_4. These are concentrated aqueous solutions of the ammonium salts of the monomethyl, ethyl, propyl, butyl, and amyl o-phosphates. They are insoluble in alcohol. They have found application as humectants and as fireproofing compounds with the distinctive property that treated materials retain their luster and flexibility. The butyl, and particularly the amyl, derivatives possess good penetrating ability. Victor Chem. Works.

AMMONIUM HEXAPHOSPHATE DINITRIDE

$(NH_4)_6P_6O_{15}N_2$. White, free-flowing powder, somewhat hygroscopic. It is soluble in water and is non-crystallizable. Its dilute solutions have a pH of 4.8. Its outstanding property is that it softens hard water by forming soluble complexes with calcium and magnesium ions. An efficient fireproofing compound with the added advantage that it does not render the treated fabric stiff or harsh to the feel. Stable in alkaline solutions up to pH 8.5; decomposes at 130° C. with loss of ammonia. Victor Chem. Works.

AMMONIUM LAURATE (Anhydrous) S

Tan-colored, waxy material, M.P. 48-50° C.; sol. alcohol and mineral oil in the cold, sol. hot vegetable oils. 10% aqueous dispersion has a pH of 7.7. Readily dispersable in water, it is an excellent emulsifying agent for the production of oil-in-water emulsions with high oil content, free from ammonia odor. Glyco Products Co., Inc.

AMMONIUM STEARATE (Anhydrous) S

Tan-colored, waxy solid, M.P. 74-76° C. Sol. hot alcohol, oils, and hydrocarbon solvents. Sp. Gr. at 25/25° C., 0.889; 3% aqueous dispersions in water has a pH of 7.5 at 25° C. Forms stable, white paste or fluid emulsions when dispersed in boiling water, cooling while stirring. Suitable for cosmetic purposes where, previously, ammonium soaps were ruled out because of odor. As a water dispersion, makes an excellent waterproofing agent for mixing cements, mortars, etc. Glyco Products Co., Inc.

AROCHEM 55

Modified phenolic of high phenol-formaldehyde condensation content. It bodies well; its varnish films are hard and tough, color-retentive and alkali-proof. Versatile for use in porch and deck paints, floor varnishes and industrial and shelf goods in general, including whites. Acid No., 13-18; M.P. 140-145° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROCHEM 60 X LIGHT

A specially-constructed, high condensation modified phenolic, having good bodying properties with oils other than China Wood, and giving films which are hard, tough and chemically resistant. Use, similar to that of the "55"; its additional bodying characteristics make it valuable also for gloss printing-ink bases, and overprint varnishes. Acid No., 12-17; M.P., 157-162° C.; lbs. per. gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROCHEM 75

Has an even higher phenol-formaldehyde condensation content than the "60" for use along the same general lines as the latter. Its M.P. is higher and is recommended for very hard quick-drying varnishes, like rubbing varnishes, as well as for oils other than China Wood. Acid No., 23-28; M.P., 167-172° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROCHEM 80

Modified phenolic, specially-constructed for shelf goods, possessing necessary quick-drying properties, hardness and color retentiveness. Whites made with it are very white and remain so. Acid No., 12-18; M.P., 135-140° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROCHEM 90 X LIGHT

Modified phenolic similar to "Arochem 95 X-Light," with slightly lower M.P. and degree of hardness than the "95". This is a versatile, economical resin. Used for industrial varnishes, and enamels, either the air-drying or baking type. Also used in package goods, but not quite as color-retentive as the "80". Acid No., 10-15; M.P., 130-135° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROCHEM 120

Modified phenolic, high in phenol-formaldehyde, finding large use for tough, alkali-resistant varnishes, porch and deck paints etc. An excellent resin where color-retention and yellowing properties are not of first importance. Not recommended for whites. Can also be used with oils other than China Wood. Acid No., 12-18; M.P., 140-145° C.; lbs. per gal. at 20° C., 9.3. Stroock & Wittenberg Corp.

AROCHEM 130

Unique, processed Congo, phenol-formaldehyde combination. As may be expected from its composition, it produces varnishes which combine depth of film of the naturals with hardness, speed of dry and chemical resistance of the phenolics. Acid No., 15-20; M.P., 140-145° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

Alphabetical list of companies and their addresses whose products are described on these pages is given on pages 711-712.

AROCHEM 505

A modified maleic with a little lower M.P. than "Arochem 520." Compatible with nitrocellulose and ethyl cellulose. Also used in color-retentive varnishes, both air-drying and baking. Acid No., 10-15; M.P., 110-115° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROCHEM 510

A modified maleic like the "505," with M.P. between that of the "505" and "520." Has unusual property, for a material of this type, of being entirely sol. mineral spirits and other petroleum hydrocarbons. Possible to use it cold cut in combination with alkyds which are extended with mineral spirits, to improve lustre and hardness. Acid No., 18-23; M.P., 130-135° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROCHEM 520

An unusually pale, high melting, modified maleic for use in lacquers and very color-retentive, air-drying and baking varnishes. Has excellent tolerance for ethyl alcohol and such lacquer oils as "ADM 100." In lacquers, particularly sanding sealer, has exceptionally rapid solvent release. Acid No., 28-33; M.P., 140-145° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROFENE 700

Pure phenol-formaldehyde condensate, practically water-white, for spar varnishes and general varnish, varnish resin fortification, to improve speed and hardness of dry and chemical resistance. Works well with oils other than China Wood. Acid No., 50-60; M.P., 80-90° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

AROPLAZ 905

Pure alkyd resin (glycerol phthalate type) short in non-drying oil, recommended for use with nitrocellulose. Gives very hard, light-colored and color-retentive films, with exceptionally good durability and cold-check resistance. Essentially insol. alcohol and petroleum hydrocarbons but readily extended with toluol and lacquer solvents. Stroock & Wittenberg Corp.

AROPLAZ 930

Pure, specially-constructed alkyd, short in non-drying oil, particularly designed for nitrocellulose lacquers to which it imparts extreme flexibility and adhesion over wide ranges of temperature. Used in lacquers for coating such materials as rubber, fabrics, leather and paper. Sol. ethyl alcohol, coal-tar hydrocarbons, and lacquer solvents. Very slightly sol. petroleum hydrocarbons. Stroock & Wittenberg Corp.

AROPLAZ 940

A medium drying oil, pure alkyd, for general utility work. Has excellent color and color retention, extendable with mineral spirits in any proportion, and used for brushing, spraying, air-drying or baking. Stroock & Wittenberg Corp.

AROPLAZ 960

A medium-to-long, non-drying oil combination, pure alkyd, designed for use as architectural enamel base for package goods and industrial work. Has excellent color and color retention and will brush without sagging or blooming. Can be extended entirely with petroleum hydrocarbons. Stroock & Wittenberg Corp.

ATLAS G-904, MANNITAN MONOLAURATE

Viscous, oily liquid. Setting P. 15-20° C. Refract. ind. 1.475 at 25° C. Viscosity, 2,000-4,000 cp. at 25° C. Acid no., below 6. Water-insoluble. Soluble most organic solvents. Stable in solutions pH 0.5-12.0 at 25° C. Highly surface active. An excellent oil-in-water emulsifier for animal and vegetable oils and fats. Cont.—1, 5, 55 gals. (8.5 lbs. per gal.). Atlas Powder Co.

ATLAS G-908, MANNITAN MONOSTEARATE

Synthetic vegetable-type wax, almost colorless. S. P. 45-55° C. Acid no., below 6. Sol. lower alcohols and alcohol-ethers. Excellent oil-in-water emulsifier for vegetable oils and waxes, for cosmetic preparations, polishes, creams, etc. White emulsions without soapiness Cont.—1, 5, 55 gals. (8.5 lbs. per gal.). Atlas Powder Co.

AURAMINE SP. CONC.

Recent addition of a basic yellow having the same general fastness properties as "Auramine O Conc." but possessing superior solubility in alcohol. National Aniline & Chemical Co., Inc.

BC VOLCLAY

Bentonite dust. Particle size, less than 5 microns. The grit that occurs in natural Wyoming Bentonite has been removed by a special process. American Colloid Co.

BEACON WAXES, GROUP 1

Series of hard, high-melting synthetic waxes. Includes 19 products ranging in color from light brown to black; M.P. of this group ranges from 58° to 85° C.; acid no., 13-26; hardness, 6. Nearly all are brittle, with high gloss. Uses—waterproofing agents for paper, textiles, etc.; mfr. shoe and wood polishes, phonograph records, carbon paper, candles; finish for leather; hardening of candles and paraffin wax. The Beacon Co.

BEACON WAXES, GROUP 2

Series of 13 synthetic waxes, of about the hardness of Candelilla. Yellow to brown; hardness, 4 or 5. M.P. range, 51° to 85° C. Tough materials, buffing to a high gloss. Uses—mfr. Carnauba substitutes for furniture and leather polishes; mfr. cements, candles, varnishes, shoe polishes, electrical insulation, sizes for rubber and paper. The Beacon Co.

BEACON WAXES, GROUP 3

Series of 16 products of hardness approximately equal to that of bleached Montan. Color ranges from cream to tan. Hardness, 3-3½. M.P. varies from 38° to 59° C., acid no. from 2 to 83. Uses—mfr. paints, varnishes, candles, soaps, adhesives, electrical insulation, polishing compositions, Carnauba and Beeswax substitutes. The Beacon Co.

BEACON WAXES, GROUP 4

Series of 9 synthetic products, about as hard as Beeswax. M.P. range, from fluid at room temperature up to about 54° C. Color, ivory through buff. Hardness, 1-2½. Acid no., 9-86. Uses—mfr. wood, leather, and metal polishes; adhesives, sealing compositions, plasticizers, paper and textile sizes; cosmetics; engraving and lithography; candles; Beeswax substitutes. The Beacon Co.

BEACON WAXES, GROUP 5

4 water-emulsifiable waxes, hardness 2-6. M.P., from 40° to 76° C. Uses—mfr. polishing materials, sizes. The Beacon Co.

BEETLE RESIN EMULSION #19

Low-cost urea-formaldehyde material, replacing starches and gums in textile processing. Used to make permanent or semi-permanent starchless finishes, depending on the heat treatment. Imparts full, mellow hand, is stable to light, requires no soaping after drying; suitable for application to percales and spun rayon dress fabrics. Calco Chem. Div., American Cyanamid Co.

BEETLE TEXTILE RESIN #250

Urea-formaldehyde syrup, completely miscible in water. Contains 80% resin, stable even on long standing. Used in water solution as a textile finish, rendered insol. and perm. to washing by heat treatment. Chief applications are for sizing and glazed chintz effects. Calco Chem. Div., American Cyanamid Co.

BENZENE HEXACHLORIDE

$C_6H_6Cl_6$. B. P. 288° C. Sp. Gr., 1.87-1.89. White, crystalline powder, of irritating, penetrating odor. Contains at least 2 stereo-isomeric modifications, that forming the major part having a M. P. of 157° C., the other subliming at 310° C. When heated with alkali, forms trichlorobenzene and HCl. The Dow Chemical Co.

BETA-METHYLNAPHTHALENE

b-$(CH_3)C_{10}H_7$. M.W. 131.19. Fr. P., 31-33° C. White, crystalline solid, sometimes semi-fluid at room temperatures. Uses—intermediate in mfr. dyestuffs; mfr. insecticides; high-boiling special solvent. Reilly Tar & Chemical Corp.

BORIRESIN

Viscous, water-soluble synthetic resin; amber color. Miscible with polyhydric alcohols; will not freeze or crystallize at —10° C. Forms glossy, transparent films which are non-tacky and become extremely hard. The Beacon Co.

BRILLANT BLUE 5B

Latest addition to company's line of basic blues, excellently suited for the dyeing of silk, paper and tannin-mordanted cotton. In phosphotungstic lakes, yields exceptionally bright shades of blue. National Aniline & Chemical Co., Inc.

BRILLIANT INDIGO 4BJD PRINTING PASTE

Vat printing blue recently added to company's line, particularly adapted to the printing of rayon. National Aniline & Chemical Co., Inc.

BUTADIENE

$CH_2{=}CHCH{=}CH_2$. M. W. 54.046. B. P. —4.5° C. Vap. press., 43 lbs./sq. in. (abs.). The well-known basic ingredient of "Buna" rubber. The Dow Chemical Co.

BUTYL BENZALACETONE OXALATE

(C_6H_5) CH = CH — CO — CH = C(OH)-$COOC_4H_9$. Light-screen medium, used as an ingredient of "sun-tan" lotions. Prevents light transmission up to 4500 Angstroms. U. S. Industrial Chemicals, Inc.

BUTYL "CARBITOL" ACETATE

$CH_3COOCH_2CH_2OCH_2CH_2OC_4H_9$. Water-insoluble liquid; B.P. 246.4° C.; nitrocellulose dilution ratio with xylene, 1.8. Miscible with most organic liquids; dissolves many oils, resins, and gums. With such a high boiling point, it is useful in formulations of nitrocellulose and synthetic resin coatings. In fact, its boiling point is so high that if there are substances present which are good solvents for this ester, it will be retained by the film and act as a plasticizer. Carbide and Carbon Chemicals Corp.

n-BUTYL DIETHANOLAMINE

Water-white to pale straw-colored liquid of slightly ammoniacal odor. Sp. Gr. at 20° C., 0.97; dist. range (Engler), 272-315° C. Sharples Solvents Corp.

For your convenience in asking for more detailed information on any of these products we suggest use of coupon on page 698.

CALCIUM DICHROMATE, C. P.

$CaCr_2O_7$. M. W. 256.07. Brownish-red deliquescent crystals. Very soluble in water. Gesing Chem. Co.

CALCO FOOD COLORS

Two new food colors, FD&C Orange No. 2 and FD&C Red No. 32, oil-sol. dyes, were added this year to the exclusive Federal list of permissible coal-tar food colors. Proven harmless for use in foods, drugs, and cosmetics. FD&C Orange No. 2 is 1-orthotolylazo-2-naphthol; FD&C Red No. 32 is 1-xylylazo-2-naphthol. Calco Chemical Div., American Cyanamid Co.

CALCONYL COLORS

Series of stabilized azoic ice colors for printing fast shades on linen, cotton, and rayon. Characterized by high stability, even after long storage, producing exceptional uniformity of shade and strength. Powders contain the stabilized diazo together with a coupling component (usually, a beta-oxy naphthoic acid derivative). After printing, color is developed on the fiber in an acid agar in the usual manner. Colors are available as both solutions and powders. Calco Chemical Div., American Cyanamid Co.

CALCOTEX PRINTING EMULSIONS

New departure in the field of textile printing; pigmented synthetic resins emulsified in water, applied to the cloth on standard printing machines, permanently fixed by a short cure. Make possible elimination of steps in processing, observation of the design immediately after printing, and the use of fine line engravings. Made in a full range of colors with excellent fastness to light, washing and crocking. Calco Chemical Div., American Cyanamid Co.

CARBANTHRENE RED BROWN R DOUBLE PASTE

Produces on cotton, rayon or linen, reddish brown shades of good fastness to sea water, washing, perspiration and alkali; excellent fastness to cross dyeing and water. Reduces readily, levels well; suitable for use in open tubs or machines. National Aniline & Chemical Co., Inc.

CARBON BLACK DISPERSION IN LITHO VARNISH

Developed as a high-grade printing ink material for mfr. offset and half-tone inks. Black is in 30% concentration, eliminating necessity for grinding a vehicle and pigment together. United Carbon Co., Inc.

CARBON BLACK DISPERSION IN MINERAL OIL

Recently developed for formulation of carbon copy inks. Contains 45% black in low-viscosity mineral oil. Represents very high degree of dispersion in the medium, eliminating necessity for grinding in compounding carbon copy inks. Can be extended to lower concentrations by mixing with appropriate oils, waxes, etc. United Carbon Co., Inc.

CELITE NO. 281

New-type, very fine, light-weight amorphous silica recommended as an extender for both exterior and interior paints. The easiest grinding, pure white inert extender readily available. Has good suspension qualities, great bulk, high body, good brushing, leveling and application properties. Johns-Manville.

CELITE NO. 535

Designed especially for high flow and good clarity, particularly for viscous and semi-viscous materials such as syrups, heavy varnishes and waxes. Like other "Celite" filter-aids, it is inert so that it does not affect the chemical or physical characteristics of the filtrate. Johns-Manville.

CELITE NO. 545

An especially high flow rate filter-aid, particularly for clarifying highly viscous materials. A finely divided, porous light-weight material milled from especially pure diatomaceous silica, which is inert and does not affect the chemical or physical characteristics of the filtrate. Johns-Manville.

o-CHLORACETOACETANILIDE

$CH_3COCH_2CONHC_6H_4Cl$. White, crystalline solid, M.P. about 107° C. Susceptible to numerous condensation and substitution reactions which characterize compounds containing a reactive carbonyl and methylene group. Under the influence of dehydrating agents, ring closure occurs with the formation of chlorhydroxy methyl quinolines. The methylene group may be acylated or alkylated with chlorides by standard methods. This product condenses with phenylhydrazines, particularly the nitro derivatives, to give corresponding hydrazones. Carbide and Carbon Chemicals Corp.

2-CHLORO-4-tert-AMYL PHENOL

Water-white liquid, aromatic odor. Sp. Gr. at 20° C., 1.11; dist. range (Engler), 253-264.5° C. Uses—mfr. insecticides and antiseptics; mfr. additive compounds for lubricating oils. Sharples Solvents Corp.

2-CHLORO-4,6-DI-tert-AMYL PHENOL

Pale straw-colored liquid, almost no odor. Sp. Gr. at 20° C., 1.01; B.P. (22 mm.), 160-179° C. Sharples Solvents Corp.

CHOVIS

Plastic fatty synthetic phosphatide, sol. in oils. Has power to imbibe aqueous media; promotes water-in-oil emulsions, reduces chocolate liquor viscosities, and other suspensions of solids in oily media. Used in mfr. chocolate, printing inks, and paints. The Emulsol Corp.

CHROME REFINISHING KIT

Complete kit for renewing and preserving the beauty of chromium-plated auto parts. Includes: Tube of Du Pont Chrome Cleaner—powerful paste cleaner made especially for removing rust spots and stains from chromium. Restores the original shine if the chromium is not badly corroded; Can of Du Pont Chrome Lacquer—Clear, methacrylate lacquer which will waterproof the chromium and protect it from moisture, sal spray, calcium chloride and other elements which cause rust and corrosion. Dries in 15 minutes, forms a clear invisible film of great durability; Soft Bristle Brush—For applying the Lacquer. E. I. du Pont de Nemours and Co. (Inc.)

CHROMIUM BORATE (Pure)

Blue, amorphous powder. Insoluble in water. Gesing Chem. Co.

COLLABAN

Fine, white, water-soluble powder. Forms colloidal solutions. 10% solution in water has a Sp. Gr. of 1.05 and a viscosity at 20° C of 7.4 centipoises. Uses—photographic compositions; sizing; protective colloid; cosmetics, etc. Available in various size packages. Harris-Seybold-Potter Co.

COOLING SYSTEM CLEANSER

Acid-type cleanser for cleaning automotive cooling systems. Removes rust, scale and scum thoroughly without injuring the hose or metal parts. Stops overheating—increases engine efficiency. Unlike many acid cleaners, which merely loosen the rust particles from the cylinder walls, the "Cleanser" actually dissolves the rust and makes the entire cooling system chemically clean—it even dissolves any hard water scale which may have formed in the radiator passages. Thus, the rust and scale flow out with the dirty water when the radiator is drained. Because of this unique action, reverse flushing is unnecessary. E. I. du Pont de Nemours & Co. (Inc.)

COPPER BORATE (Cupric, Pure)

Composition, variable. Blue, crystalline powder. Insoluble in water, slightly soluble in alcohol, soluble in acids. Gesing Chem. Co.

COPPER CARBONATE

A high-grade material containing 56% copper; has fine particle size, and is light, fluffy, and very adherent. An excellent dusting fungicide for seed wheat to control smut or bunt; its purity and uniformity make it especially desirable for copper plating. Tennessee Corp.

COPPER CITRATE, C. P. (Cupric)

$2Cu_2C_6H_4O_7.5H_2O$. Bluish-green powder. Soluble in ammonia and acids; slightly soluble in water. Gesing Chem. Co.

"26" COPPER FUNGICIDE

Water-insoluble copper fungicide containing 26% copper; of fine particle size and very stable. Uses—as a dust or spray for control of fungus diseases on fruits and vegetables, especially for apples and other fruits. Tennessee Corp.

"34" COPPER FUNGICIDE

Water-insoluble fungicide containing 34% copper; has fine particle size and good stability Uses—spray and dust for control of fungus diseases of fruits and vegetables. Tennesseee Corp.

CORESINBLACK

Specially ground colloidal dispersion of carbon black in alkyd resin. Used to make fine quality black synthetic resin finishes. Contains 18% carbon black, 32% resin, 50% solvent. Formulated into enamel by merely adding additional resin solution with the appropriate amount of solvent and driers. These enamels, compared with similar products prepared by ordinary methods, are characterized and known for exceptional jetness of color, blue tone, high gloss, and maximum weathering resistance. Binney & Smith Co.

CYCLOHEXANE

C_6H_{12}. M.W. 84.15. Water-white (under 20 Hazen) liquid, B.P., 79.0-82.0° C.; 95% distills within 1.5° C. Flash P., under 10° F.; Sp. Gr. at 25/4° C., 0.773-0.775; less than 0.2% water; leaves no residue on evaporation. Lbs. per gal., 6.5. Produced by hydrogenating benzol Uses—solvent for oils, fats, waxes, crude rubber, bitumen, and ethyl cellulose; degreasing solvent. The Barrett Co.

CYCLOHEXANOL

$C_6H_{12}O$. M.W. 100.15. Water-white (less than 20 Hazen) liquid, 95% distilling within 3.0° C.; B.P., 158.0-162.0° C. Leaves no residue on evaporation, and has no acidity. Water content, less than 0.2%; Sp. Grav. at 25/4° C., 0.943-0.946. Flash point, approx. 68° C. Produced by hydrogenating phenol. Used as a solvent for many waxes, fats, oils, synthetic and natural resins; in the mfr. of soaps, lacquers, emulsion stabilizers, homogenizers and blending agents, plastics, polishes, etc. The Barrett Co.

CYCLOHEXANONE

$C_6H_{10}O$. M.W. 98.14. Water-white (less than 20 Hazen) liquid, 95% distilling within 3.0° C.; B.P., 151.0-157.0° C. Leaves no residue on evaporation, and has no acidity. Water content,

Alphabetical list of companies and their addresses whose products are described on these pages is given on pages 711-712.

less than 0.2%; Sp. Gr. at 25/4° C., 0.941-0.945. Fl. P., approx. 47° C. Produced by incompletely hydrogenating phenol. Used as a solvent for cellulose esters and ethers, crude rubber, many oils, fats, waxes, natural and synthetic resins; used in mfr. lacquers, resins, enamels, inks, polishes, etc. The Barrett Co.

CYCLOSUL

$(C_4H_7NO)_2SO_3$. Morpholine sulfite. White crystals very sol. in water. Slightly sol. in cold alcohols, very sol. in hot alcohols. Comparatively non-toxic. Use—anti-oxidant. Available in various size packages. Harris-Seybold-Potter Co.

DEGREASER 124

Dark amber liquid, sol. oils and greases. Forms emulsions with cold water and when used with 6 parts kerosene, is an excellent agent for removing grease from motors, garage floors, etc. The Beacon Co.

DELTYL EXTRA

Odorless oil of vegetable origin. Will not turn rancid. Congeal. P., 3-4° C.; sp. gr. 0.852-0.854. No acidity. Sapon. val., 203-215. Sol. alcohol, mineral and vegetable oils. Uses—cosmetic penetrant; solvent for cholesterol. Givaudan-Delawanna, Inc.

DEREX

Insecticide concentrate, being a solution of derris extractives in *a, a*-dimethyl-*a'*-carbobutoxydihydro-gamma-pyrone. Used in mfr. liquid contact insecticides for household and agricultural purposes. U. S. Industrial Chemicals, Inc.

DEVELOPED BRILLIANT GREEN 3G

When diazotized and developed with "National Developer Z," yields bright, yellowish-green shades of fair fastness to washing, very good fastness to stoving and acid spotting. Possesses excellent solubility, levels well. Suitable for use in all kinds of machines. Leaves acetate rayon affected unstained and discharges readily, particularly on rayon. National Aniline & Chemical Co., Inc.

DIALKYL PHOSPHATES

R_2HPO_4. Exemplified by diamyl hydrogen phosphate, and mixed esters such as octyl amyl hydrogen phosphate and butyl amyl hydrogen phosphate, these compounds are liquids which are sparingly soluble in water, and soluble in alcohol and vegetable oils. With increasing molecular weight, they become soluble in petroleum oils. Victor Chem. Works.

n-DIBUTYLAMINO-ETHANOL

Pale straw-colored liquid, faint amine-like odor. Sp. Gr. at 20° C., 0.859; dist. range (Engler), 224-232° C. Of interest in mfr. of pharmaceutical and textile chemicals. Sharples Solvents Corp.

DICALITE 14

A finely divided material, not more than 6% retained on 325 mesh. Pink in color, moisture free; no loss on ignition. This material is meeting requirements of the plastic industry successfully because of its ability to increase strength and decrease brittleness in the final plastic. The Dicalite Co.

DICALITE 14-B

Has same color as "Dicalite 14," but not quite as finely divided. This material is used in plastics where a good absorptive material is required. It is moisture free and has no ignition loss. The Dicalite Co.

DICALITE 14-W

Finely divided, white material; has the same characteristics as "Dicalite 14" except for the color. Used especially where the final plastic is to be of a light or white color. Has no ignition loss; is moisture free. Has slightly lower absorption than "Dicalite 14." The Dicalite Co.

2,5-DICHLORACETOACETANILIDE

$CH_3COCH_2CONHC_6H_3Cl_2$. White, crystalline solid, M.P. about 96° C.; quite active chemically. Coupled with various aniline derivatives, a series of azo yellows known as Hansa colors are produced. These are not darkened by sulfur in the air, have high tinctorial power, possess improved working properties in printing inks. Carbide and Carbon Chemicals Corp.

DICHLORISOPROPYL ETHER

$ClCH_2(CH_3)CHOCH(CH_3)CH_2Cl$. Colorless liquid, B.P. 187.3° C. Miscible with practically all oils and organic solvents but immiscible with water. Good solvent and extractant for fats, waxes, and greases; may be used in paint and varnish removers, spotting agents, and cleaning solutions. Amines, nitriles, acids, and other products made chemically from it tend to be less water-soluble and more oil-soluble than those made from dichlorethyl ether because of the presence of 2 extra methyl groups. Carbide and Carbon Chemicals Corp.

2,6-DICHLORO-4-tert-AMYL PHENOL

White crystalline solid, strong aromatic odor. M.P., 55-63° C.; B.P. (15 mm.), 155-170° C. Sharples Solvents Corp.

DIETHYLAMINOETHANOL

$(C_2H_5)_2N(CH_2CH_2OH)$. Colorless, hygroscopic liquid, B.P. 162.1° C. Completely sol. in water, alcohol. Basic in character; readily furnishes water-soluble salts. Forms fatty acid derivatives which are textile softeners and emulsifiers in acid media. Being in the family of alkylolamines, it combines properties of amines and alcohols and yields derivatives containing tertiary amine groups. Carbide and Carbon Chemicals Corp.

DIETHYL "CARBITOL"

$(C_2H_5OC_2H_4)_2O$. Colorless, almost odorless liquid, B.P. 187.9° C. Slow evaporation rate and high solvent power for nitrocellulose and resins indicate its use as a high-boiler in brushing lacquers. Like Diethyl "Cellosolve," which it resembles in most properties, it is a powerful mutual solvent. Composed entirely of ether and hydrocarbon groups, it is chemically inert and makes an excellent high-boiling reaction medium. Carbide and Carbon Chemicals Corp.

DIETHYL "CELLOSOLVE"

$C_2H_5OCH_2CH_2OC_2H_5$ Colorless liquid with a slight ethereal odor. B.P. 121.4° C. Added to colloidal systems, such as detergents and wetting agents of limited water solubility, permits dilution with water without gelling or clouding. The combination of its ethyl and ether groups makes it a stable compound which can be used as an inert reaction medium. Carbide and Carbon Chemicals Corp.

DIETHYLENE TRIAMINE

$NH_2CH_2CH_2NHCH_2CH_2NH_2$. Hygroscopic, somewhat viscous liquid; B.P. 206.7° C. Completely soluble in water and hydrocarbons A strongly alkaline, high-boiling solvent for sulfur, acid gases, and various resins and dyes It will react with acidic materials, such as fatty acids, to form soaps which dehydrate to amides. It has derivatives of interest to the rubber, resin, dye, and textile industries. Carbide and Carbon Chemicals Corp.

DIGLYCOL RICINOLEATE

Light-colored, oily liquid; Freezing P., below 80° C. Sp. Gr., 0.980; sap. val., 156.5. Completely sol. in methanol, ethanol, acetone, ethyl acetate; in certain proportions, sol. in toluol, mineral spirits and mineral oil; insol. in water. Glyco Products Co., Inc.

DIISOBUTYL KETONE

$(CH_3)_2CHCH_2COCH_2CH(CH_3)_2$. Colorless liquid, miscible with most organic liquids. B.P. 168.1° C; xylene dilution ratio, 1.5. Its excellent solvent power for rubber, nitrocellulose, and synthetic resins makes it a promising material for protective coatings where a stable, slow-evaporating solvent is desired. Its possibilities in syntheses should not be overlooked. Carbide and Carbon Chemicals Corp.

DIMETHOXYTETRAGLYCOL

$(CH_3OC_2H_4OC_2H_4)_2O$. Stable, water-white liquid, B.P. 275.8° C. Is the dimethyl ether of tetraethylene glycol. Consists entirely of hydrocarbon and ether groups, completely sol. in water. Presence of 5 ether groups in its molecule indicates high solvent power. Its low volatility suggests its use as a plasticizer, while chemical inertness makes it suitable as a neutral reaction medium. Carbide and Carbon Chemicals Corp.

A, *A*-DIMETHYL-*A'*-CARBOBUTOXYDIHYDRO-GAMMA-PYRONE

$(CH_3)_2C{=}CH{-}CO{-}CH{=}C(OH)COOC_4H_9$. Used as a light-screen medium, insecticide, and fungicide. Solvent for rotenone and derris root extractives. Used in formulation of insect-repellent cosmetic lotions and of concentrates for making liquid contact insecticides. U. S. Industrial Chemicals, Inc.

DIPROPYLENE GLYCOL

$(CH_3CHOHCH_2)_2O$. Colorless, slightly viscous liquid having a higher B.P. (231.8° C.) than propylene glycol. Of interest for those applications where a less volatile glycol is desirable. Completely soluble in water, toluol (but not gasoline); solvent for nitrocellulose, shellac, and partial solvent for cellulose acetate. Owing to its ether linkage, is a more active solvent than propylene glycol. As a high-boiling, odorless coupling agent or mutual solvent for normally immiscible liquid systems, is distinctly superior to the corresponding ethylene compound. Adsorbs moisture from the air, but has only half the hygroscopicity of diethylene glycol. Carbide and Carbon Chemicals Corp.

DIVANADYL TETRACHLORIDE (Pure)

$V_2O_2Cl_4 \cdot 5H_2O$. Also known as hypovanadic hypochloride, vanadium chloride. Dark green mass. Gesing Chem. Co.

DOW PLASTIC VC

Finely divided, white, powdery, thermoplastic resin (Sp. Gr. 1.68). Soft. P., 100-175° C. It shows no water absorption; unaffected by mineral salts, acids and alkalies in high and low concentrations. Insoluble in most organic solvents, with exception of dioxane, cyclohexanone and ortho-dichlorobenzene. The resin is nonflammable. The Dow Chemical Co.

DU PONT RUBBER YELLOW G

New yellow color for rubber which has exceptional brilliance, cleanliness and light-fastness. More nearly a neutral yellow than any other available, being practically free from any red or green undertone. In addition, has exceptional color strength which makes it an economical pigment to use. E. I. du Pont de Nemours and Co. (Inc.)

EMULSIFYING BASE #821

Detergent and emulsifying agent in paste form. Equally effective in neutral, acid or alkaline solutions; not subject to hydrolysis; shows considerable stability in the presence of most metallic salts. May be used in combination with superfatted or alkaline soaps, or by itself. The Beacon Co.

EMULSOL H. C. P.

Liquid mixture of polyglycols, miscible with oils. Freely dispersible in aqueous media. Has many interesting surface tension depressing, emulsifying, and wetting-out properties. The Emulsol Corp.

EMULSOL K-480

Surface tension depressant. Has several unique properties. Very effective in the differential froth flotation of KCl out of KCl-NaCl mixtures. The Emulsol Corp.

EMULSOL 346

Fine, crystalline material, consisting of sulfoacetic acid derivatives. Has unique interface-modifying properties and pronounced wetting-out, detergent and emulsifying powers. Uses—cosmetics, toilet preparations, textile processing, fine fabric washing. The Emulsol Corp.

EMULSOL 903-L

Dark-colored liquid. Active surface tension depressant and frother. Used as cationic agent in froth flotation of minerals. The Emulsol Corp.

For your convenience in asking for more detailed information on any of these products we suggest use of coupon on page 698.

EMULSOL 1150-CA

Waxy solid, freely dispersible in oil and aqueous media. Imparts extraordinary stability to oil and water emulsions. Uses—mfr. cosmetics; textile processing, etc. The Emulsol Corp.

EMULSTEROLENE

Brown, wax-like solid, M.P. 53° C. Dispersible in hot water. Sol. organic solvents. Finds use as a thickening and emulsifying agent. The Beacon Co.

EMULSTRENE

Light buff, wax-like solid, M.P. 48° C. Dispersible in hot and cold water. Sol. organic solvents. A very fine thickening and emulsifying agent. The Beacon Co.

2-ETHYLBUTYRALDEHYDE

$(C_2H_5)_2CHCHO$. Also known as diethyl acetaldehyde. Water-insoluble, colorless liquid, B.P. 116.8° C. Shows particular promise in preparation of certain pharmaceuticals, rubber accelerators, and synthetic resins. Can be used in the synthesis of nitriles, hydroxy acids, acetals, and a host of other organic products. Carbide and Carbon Chemicals Corp.

ETHYL PHENYL ETHANOLAMINE

$C_6H_5N(C_2H_5)CH_2CH_2OH$. Azo dyestuffs can be obtained by coupling it with various diazo compounds. Undergoes characteristic reactions of a tertiary amine and is being investigated for other intermediate uses. Light-colored solid, M.P. 42° C. Carbide and Carbon Chemicals Corp.

2-ETHYL-3-PROPYLACROLEIN

$CH_3CH_2CH_2CH{=}C(C_2H_5)CHO$. Yellow liquid, B.P. 175.0° C. Has powerful odor, which suggests its use in warning agents, insecticides, and leak detectors. Occasionally referred to as 2-ethylhexenal, this unsaturated octaldehyde contains a reactive double bond and may be used as an intermediate in many syntheses. Carbide and Carbon Chemicals Corp.

ETHYL SODIUM POTASSIUM PHOSPHATE

Used in 60% water solution as wool spinning lubricant. Superior to olive oil for this purpose, readily rinsing out with water. Fibers lubricated with this sol'n are good conductors, static being eliminated. The 60% sol'n has sp. gr. of 1.37, and pH of 7.0-7.4. Lbs. per gal., 11.4. Merrimac Division, Monsanto Chem. Co.

ETHYL TIGLATE

Very strong and very fruity-odored ester, used in imitation flavors; especially useful for strawberry, raspberry, and other fruit flavors. Fairmount Chem. Co., Inc.

EXCELSIOR BEADS

Represent the application of pellet form to a carbon black of good color and strength in a low cost range. Outstanding factors are cleanliness, ease of handling, and reduction of ball mill grinding time. Find ready application in all kinds of paint and industrial coatings. Binney & Smith Co.

FALBA

An oxycholesterin concentrate; practically odorless and greaseless; easily perfumed; absorbs 5 times its weight of aqueous media. Stable to acid and alkali; non-smearing lubricant and emollient. Forms colloidal water-in-oil emulsions. Pfaltz & Bauer, Inc.

FAST LIGHT RUBINE BL

Acid red of outstanding fastness to light. Provides a companion product to "Fast Light Yellow 2G" and "Alizarine Sapphire" for carpet yarns and ladies' dress goods where combination shades of superior light fastness are required. Readily soluble, levels well; produces a bluish shade of red. National Aniline & Chemical Co., Inc.

FAST PRINTING BLUE RB

Possesses the same excellent solubility and keeping qualities as "Fast Printing Yellow G," with the added advantage of even better light fastness. National Aniline & Chemical Co., Inc.

FAST PRINTING GREEN G

A companion product to "Fast Printing Blue RB," possessing the same excellent fastness to light and solubility in neutral or alkaline printing paste. National Aniline & Chemical Co., Inc.

FAST PRINTING YELLOW G

Printing color of good light fastness particularly intended for printing wool, although it can also be used for pure or tin-weighted silk. Possesses excellent solubility in either acid or neutral printing paste; shows relatively little tendency to thicken up or scum over on standing. National Aniline & Chemical Co., Inc.

FENCHONE

$C_{10}H_{16}O$. Decyclic ketone, an isomer of camphor. Camphor-like odor; sp. gr at 15/4° C., 0.9457; refr. ind. at 20° C., 1.4625; optical rot., + 7.4. B.P., 191.0° C. Uses—plasticizer for cellulose esters; solvent for resins, miscible with all types of solvents. General Naval Stores Div., Newport Industries, Inc.

FERRI-FLOC

A cold water-sol. ferric sulfate made especially for sewage disposal, industrial waste waters, and other types of water treatment. Tennessee Corp.

FERRISUL

Anhydrous ferric sulfate. Globular, free-flowing form, pale brown color. Readily sol. hot water; moderately sol. cold water. Uses—in conjunction with hydrofluoric acid, used for pickling stainless steel to remove the scale formed during heat-treatment. Attack on metal beneath the scale is reduced to a minimum, with no appreciable quantities of fumes from the pickling bath. Cont.—moisture-proof bags, 175 lbs.; steel drums, 400 lbs.; slack bbls., 425 lbs. (all wts. net). Merrimac Division, Monsanto Chem. Co.

FLEXO WAX C

Non-crystalline, tan-colored, dull wax; M. P., 63-74° C. (Ball and Ring), Cold flow, 63-65.5° C. Insol. in water, sol. in hot hydrocarbons. A waterproof, amorphous wax, it can be made to flow in thin layers on paper and cloth. Uses—adhesive for cellophane, cellulose acetate, and other materials; mfr. textile and leather finishes, polishes, buffing compounds, etc. Glyco Products Co., Inc.

"FLEXOL" PLASTICIZER 3G O

$C_7H_{15}COOC_2H_4(OC_2H_4)_2OOCC_7H_{15}$. The di-2-ethylhexoate of triethylene glycol; a new liquid; B.P. 215° C. at 15 mm. Hg. Has a very low vapor pressure and water solubility and possesses a great resistance to discoloration by ultra-violet light. Interesting as a softening agent for cellulose esters and ethers, as well as synthetic resins because it increases the elasticity of the product without unduly reducing the ultimate strength. Has extraordinary property of increasing flexibility of nitrocellulose as temperature is lowered from 30° to 10° C. Carbide and Carbon Chemicals Corp.

GALEX

A rosin made stable by dehydrogenation. Recommended where rosin has been indicated but could not be used previously because of its tendency to oxidize and deteriorate. Compatible with most organic solvents. Forms a crystalline mono-sulfonate with sulfuric acid. Yields crystalline alkaline salts, stable esters of mono- and polybasic alcohols. Recommended as modifier for synthetics, adhesives, electric insulating compounds, high grade paper size and coatings, rubber cements, ester gum. Typical analysis: M. P., 62-65° C. (Ball & Ring), Acid No., 155-158. Oxygen absorption, less than 1% of that of rosin. G. & A. Laboratories, Inc.

G. F. FINISH

A tung oil-synthetic resin varnish blended with small amounts of SEALACELL W. Used over SEALACELL W and VARNOWAX as a final coat, yielding a durable satin finish resistant to water, soaps, and stains. Also used as polish and restorer for old varnish, enamel, etc. Cont.—quarts, gals., and 5 gals. General Finishes, Inc.

GLYCERYL MONOSTEARATE

White wax dispersible in water. Contains no free alkalies or amines. 5% dispersion in water has a pH of 8.5. Finds use in various emulsions and, particularly, cosmetics. The Beacon Co.

GLYCERYL RICINOLEATE

Light amber, self-emulsifying oil, forming milky emulsions with cold water. Miscible with alcohols, hydrocarbons, solvents, and oils. The Beacon Co.

GLYCOL RICINOLEATE

Light amber self-emulsifying oil which forms milky emulsions with cold water. Readily miscible with alcohols, hydrocarbons, solvents, and oils. The Beacon Co.

GLYCOL DIACETATE

$CH_3COOCH_2CH_2OOCCH_3$. Water-white liquid, B P. 190.5° C. Uses—solvent for cellulose esters and ethers, for printing inks and lacquers; prevents blushing in airplane dopes; imparts suppleness to cellulose ether films; solvent for resins; perfume fixative; plasticizer for ethyl and benzyl cellulose that does not discolor. Carbide and Carbon Chemicals Corp.

GREASOLVE

Dark amber, gel-like paste, sol. oils and greases. Forms emulsions with cold water, especially useful in cleaning motors, garage floors, etc. The Beacon Co.

GUANIDINE CARBONATE

$(NH_2.CNH.NH_2)_2.H_2CO_3$. M.W. 180.17. White granules, 100% through 40 mesh, with slightly ammoniacal odor. Dec. at 197-199° C., without melting. Sol. water; ethanol, methanol, acetone—very slightly sol. at 24° C. Stable on long storage. Acids decompose the carbonate, forming the corresponding guanidine salt. Alkalies, no effect, unless an insoluble carbonate is formed, with release of free guanidine. Use—as an organic alkali. American Cyanamid & Chem. Corp.

GUANYLUREA SULFATE

$(NH_2.CNH.NH.CO.NH_2)_2.H_2SO_4.2H_2O$. M W. 338.3. White, odorless powder. Softens at 193-195° C. Sol. water, alcohol; insol. ether. Stable on long storage. Acids have no effect, nor do alkalies, except those precipitating an insol. sulfate to leave guanylurea in solution. Use—as an organic alkali. American Cyanamid & Chem. Corp.

GUM ARABIC, REFINED

A high purity white, soluble gum arabic. Available in one pound and five pound packages. Harris-Seybold-Potter Co.

HEPTACHLOROPROPANE

assym.—C_3HCl_7. B. P. 247-248° C. Sp. Gr. at 34/4° C., 1.805. Forms colorless, well-shaped needle crystals, M. P. 29.4° C. The Dow Chemical Co.

HEPTADECANOL

$C_4H_9CH(C_2H_5)C_8H_4CH(OH)C_4H_4CH(C_2H_5)_2$. Or 3,9-diethyltridecanol-6. New synthetic, secondary, branched-chain alcohol of 17 carbon atoms, comparable in molecular size to those alcohols derived from such naturally occurring materials as vegetable and animal fats and waxes. B.P. 308.5° C. Sp. Gr. 0 8475; M.W. 256.5. As a synthetic intermediate, interesting for the manufacture of plasticizers, perfume esters, cosmetic bases, dyestuffs, wetting agents, detergents, flotation agents, insecticides, and certain pharmaceuticals. In general, it serves as a useful intermediate for the introduction of alkyl groups of high molecular weight into other compounds. Carbide and Carbon Chemicals Corp.

HERCOSETT

Hercules' trade-name for emulsions of ethyl cellulose, and solutions from which these emulsions may be made, suitable for developing durable finishes on textiles. Hercosett finishes are

Alphabetical list of companies and their addresses whose products are described on these pages is given on pages 711-712.

A 6-Page Advertisement by

HERCULES POWDER COMPANY
INCORPORATED

HERCULES FACTS AND FIGURES

Headquarters for Hercules research is the extensive Experiment Station near Wilmington, where approximately a million dollars a year is spent to develop and improve Hercules products and to advance the industries using them.

Hercules is the World's Largest Producer of ★ ★ ★

NAVAL STORES

★

COMMERCIAL NITROCELLULOSE

★

CHEMICAL COTTON

★

PAPER-MAKING CHEMICALS

On the following four pages are listed some applications of Hercules products in the processing industries. See how many can be adapted to your products or processes. Use the coupon on the sixth page for further information.

USE HERCULES INDUSTRIAL EXPLOSIVES AND BLASTING SUPPLIES IN MINING, QUARRYING, CONSTRUCTION, AGRICULTURE.

Here are Some Answers to Processing Problems Based on the Use of HERCULES Products

	PAINT AND VARNISH	PAPER	FLOTATION	LACQUER	SYNTHETIC FIBERS	PLASTICS	TEXTILES
Chemical Cotton (bulk)		High-grade papers		Base for cellulose derivatives	Base for acetate and cuprammonium rayons	Base for cellulose acetate and nitrocellulose	Base for synthetic fibers
Chemical Cotton (sheet)		High-grade papers		Base for cellulose derivatives	Base for viscose rayon		
Turpentine	Solvent and thinner	Solvent		Solvent	Delustering of rayon		Printing
Pine Oil	Solvent and thinner	Coating, anti-foaming agent	Frothing agent		Delustering of rayon		Wet processing
Solvenol* (Terpene hydrocarbon)	Solvent and thinner	Removing rubber	Floating reagent				Solvent
Vinsol* (Dark-colored resin)	Special finishes	Available in PMC* prepared size		Dark lacquers		Thermoplastic, and thermo-setting compounds	
Dark Wood Rosins	Dark varnishes and enamels	Available in PMC* prepared size				Thermoplastics	
Light Wood Rosins	Varnishes and enamels	Available in PMC* prepared size				Thermoplastics	Printing
Rosin Derivatives	Varnishes	Available in PMC* prepared size				Thermoplastics	Printing
Petrex* Resins (Series of alkyds)	Varnish resins	Coating		Nitrocellulose lacquers			
Truline Binder* (pulverized dry core binder)							
Dipentene No. 122* (Terpene hydrocarbon)	Thinner, synthetic resins		Floating reagent				
Ethyl Cellulose	Toughens varnishes	Coating		Flexible lacquers		Special plastics	Special coatings
Cellulose Acetate		Coating		Airplane dopes		Injection and extrusion molding	Synthetic fabrics
Chlorinated Rubber	Improves toughness; speeds dry	Moisture-proof coating		Quick-drying lacquers		Experimental	Special coatings
Nitrocellulose		Coating		Quick-drying lacquers		Pyroxylin plastics	Artificial leather
Hercose* C (Cellulose acetobutyrate)				Weather-resistant lacquers			
Hercose* AP (Cellulose acetopropionate)				Weather-resistant lacquers			
Abalyn* (Methyl abietate)	Varnish modifer			Plasticizing agent			
Hercolyn* (Derivative of Abalyn)				Plasticizing agent		Plasticizing agent	
Textac* (Synthetic resin)							Finishing material
Casein	Casein paint	Coating				Rennet casein	
Textile chemicals							Dyestuffs, foam killers, finishes, mordants, oils, emulsions
PMC* Paper-making Chemicals		All paper-making chemicals including sizes, coatings, and specialties					

*Reg. U. S. Pat. Off. by Hercules Powder Company

Check this List: It May Suggest Applications that Will Improve Results and Cut Costs for You . . .

CONTINUED ON NEXT TWO FOLLOWING PAGES

SOAP	FILM	COATED TEXTILES	SYNTHETIC RESINS	INK	ASPHALT EMULSIONS	LEATHER AND SHOES	
	Base for nitrocellulose and cellulose acetate films						Chemical Cotton (bulk)
							Chemical Cotton (sheet)
Solvent		Antifoam		Solvent and thinner		Patent leather	Turpentine
Laundry and toilet soaps		Wetting agent	Solvent	Solvent and thinner		Degreasing and fat liquoring compounds	Pine Oil
Solvent			Solvent				Solvenol* (Terpene hydrocarbon)
			Thermosetting resins, esters, modified alkyd and phenolic	Special inks	Emulsifying agent		Vinsol* (Dark-colored resin)
Industrial cleaners and dark soaps			Ester gum, rosin, modified alkyd and phenolic	Newsprint ink, ink varnishes	Emulsifying agent	Box toes	Dark Wood Rosins
Industrial and household soaps			Ester gum, rosin, modified alkyd and phenolic	Ink varnishes	Emulsifying agent	Box toes	Light Wood Rosins
Special soaps		Resin constituents	Ester gum, rosin, modified alkyd and phenolic	Ink varnishes	Emulsifying agent		Rosin Derivatives
			Variety of resins	Ink base			Petrex* Resins (Series of alkyds)
							Truline Binder* (pulverized dry core binder)
			Solvent	Solvent			Dipentene No. 122* (Terpene hydrocarbon)
	Extreme flexibility	Extreme flexibility		High-quality inks		Stiffener	Ethyl Cellulose
	Safety film	Light-resistant					Cellulose Acetate
In inks for soap wrappers		Flameproof, waterproof compounds	Fortifier	Alkali-resistant inks			Chlorinated Rubber
	Standard film material	Standard material		Rotogravure inks		Ingredient for patent leather	Nitrocellulose
		Outdoor exposure					Hercose* C (Cellulose acetobutyrate)
							Hercose* AP (Cellulose acetopropionate)
			Modifying agent	Non-drying inks			Abalyn* (Methyl abietate)
		Plasticizing agent		Non-drying inks	Plasticizing agent		Hercolyn* (Derivative of Abalyn)
							Textac* (Synthetic resin)
							Casein
							Textile chemicals
					Emulsifying soaps		PMC* Paper-making Chemicals

More Answers to More Processing Problems Based on the Use of HERCULES Products. Ask for Information.

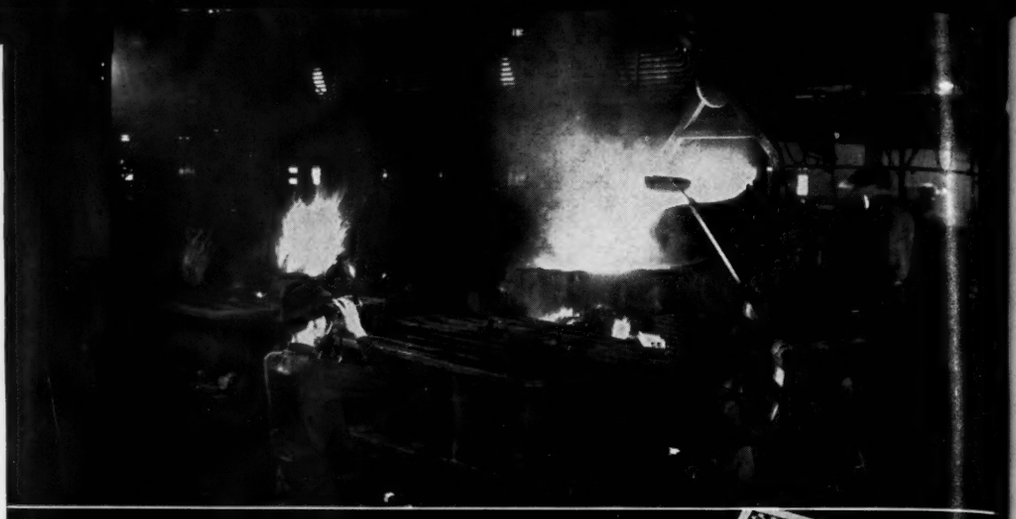
	POLISHES	DISIN-FECTANTS	MATCHES	PETROLEUM	LAUNDRY	RUBBER	FOUNDRY
Chemical Cotton (bulk)							
Chemical Cotton (sheet)							
Turpentine	Solvent and thinner	Solvent and thinner		Solvent	Washing preparations	Solvent	
Pine Oil	Solvent	Active ingredient		Solvent	Wetting agent		
Solvenol* (Terpene hydrocarbon)	Solvent	Solvent				Reclaiming softener and devulcanizing agent	
Vinsol* (Dark-colored resin)	Resin constituent		Binder				
Dark Wood Rosins	Resin constituent	Emulsifying agent	Binder	Refining process	Soap	Softener	Core binder
Light Wood Rosins	Resin constituent	Emulsifying agent	Binder	Refining process Sett greases	Soap	Softener	
Rosin Derivatives	Resin constituent	Emulsifying agent	Binder		Soap	Softener	Core binder
Petrex* Resins (Series of alkyds)							
Truline Binder* (pulverized dry core binder)							Pulverized core binder
Dipentene No. 122* (Terpene hydrocarbon)	Solvent					Solvent	
Ethyl Cellulose	Toughens waxes; fingernail polishes						
Cellulose Acetate							
Chlorinated Rubber							
Nitrocellulose	Fingernail polishes						
Hercose* C (Cellulose acetobutyrate)							
Hercose* AP (Cellulose acetopropionate)							
Abalyn* (Methyl abietate)							
Hercolyn* (Derivative of Abalyn)	Fingernail polishes						
Textac* (Synthetic resin)							
Casein							
Textile chemicals							
PMC* Paper-making Chemicals	Dresinates						

*Reg. U. S. Pat. Off. by Hercules Powder Company

Hercules Products are Tailor-made for Chemical Processes. Use the Coupon for Additional Data.

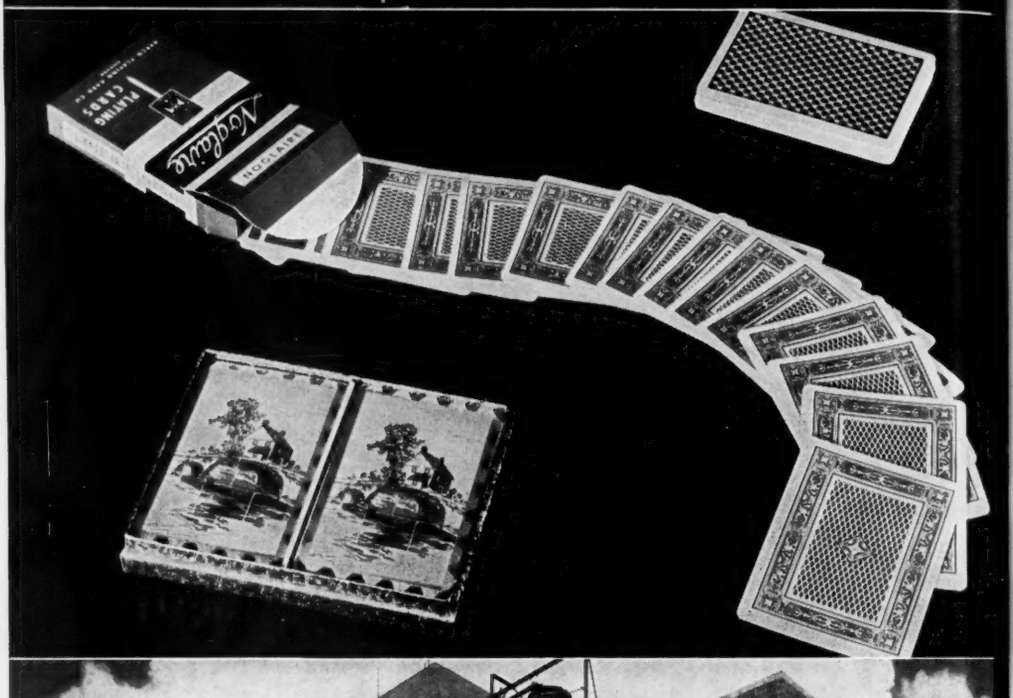
ELECTRICAL PRODUCTS	LINOLEUM	ADHESIVES	CAMPHOR (Synthetic)	ESSENTIAL OILS	MEAT PACKING	INSECTICIDES	
					Sausage casing		Chemical Cotton (bulk)
							Chemical Cotton (sheet)
Insulating varnishes	Solvent thinner	Solvent	Raw material	Synthetic perfumes and solvents		Solvent	Turpentine
Insulating varnishes	Solvent	Solvent		Synthetic perfumes	Deodorizer	Active ingredient	Pine Oil
Insulating varnishes	Solvent	Solvent		Solvent		Solvent	Solvenol* (Terpene hydrocarbon)
Insulating compounds	Resin constituent	Resin constituent					Vinsol* (Dark-colored resin)
Insulating compounds	Resin constituent	Resin constituent			Dehairing and defeathering compounds	Emulsifying agents Fly paper	Dark Wood Rosins
Insulating compounds	Resin constituent and varnishes	Resin constituent			Dehairing and defeathering compounds	Emulsifying agents Fly paper	Light Wood Rosins
Insulating compounds	Varnishes and adhesives	Resin constituent			Brisgo for dehairing hogs	Spreader, sticker	Rosin Derivatives
Protective coatings		Heat sealing					Petrex* Resins (Series of alkyds)
							Truline Binder* (pulverized dry core binder)
Insulating varnishes	Solvent	Solvent		Solvent		Solvent	Dipentene No. 122* (Terpene hydrocarbon)
Plastic and lacquer cable coating		Heat sealing					Ethyl Cellulose
Insulation				Excellent resistant coating			Cellulose Acetate
Excellent dielectric properties		Special					Chlorinated Rubber
Cable lacquers		Belt cement, shoe cement					Nitrocellulose
							Hercose* C (Cellulose acetobutyrate)
							Hercose* AP (Cellulose acetopropionate)
	Varnishes			Diluent			Abalyn* (Methyl abietate)
		Resinous adhesives		Diluent			Hercolyn* (Derivative of Abalyn)
						Spreader, sticker	Textac* (Synthetic resin)
		Casein					Casein
							Textile chemicals
	Back Sizing						PMC* Paper-making Chemicals

Examples of Progress with Hercules Raw Materials



TRULINE BINDER

Truline Binder is a product of Hercules Naval Stores Department that was unknown a few years ago. Today it is widely used as a powdered, dry-bond binder for making cores for steel, gray iron, malleable iron, aluminum, bronze, and brass castings. Its unique properties make it economical, uniform, and efficient. Have you investigated Truline Binder for your foundry problems? Usually, its application cuts costs, speeds production.



Nitrocellulose Lacquers

Charts reveal that the manufacture of quick-drying lacquers is ahead of U. S. industrial production. The market for nitrocellulose lacquers is constantly expanding, even though in certain fields they have been replaced by other finishes. A new application which has enlarged the lacquer market is as a coating on paper for use on cartons, packages, decorative papers, and even playing cards. These finishes dry quickly to permanent hardness, offer protection against the elements and soiling, and add decorative beauty. How can you use nitrocellulose lacquers in your products and processes?

Chlorinated Rubber

The rapid acceptance of Hercules Chlorinated Rubber has resulted in the erection of a new, modern plant for its manufacture at Parlin, New Jersey. This comparatively new Hercules product is used as a base for the formulation of synthetic resin enamels, paints, varnishes, lacquers, adhesives, binders, and plastics. As a reenforcing agent for synthetic finishes, it reduces drying time, speeds up production, and gives a tough, hard, durable, flexible finish.

HERCULES POWDER COMPANY
Incorporated

922-C Delaware Trust Building, Wilmington, Delaware

I SHOULD LIKE TO HAVE MORE INFORMATION ABOUT :

☐ Chlorinated Rubber	☐ Abalyn*	☐ Solvenol*	☐ Chemical Cotton
☐ Truline Binder*	☐ Hercolyn*	☐ Ethyl Cellulose	☐ Turpentine
☐ Cellulose Acetate	☐ Petrex*	☐ Hercose* C	☐ Pine Oil
☐ Vinsol*	☐ Pale Wood Rosins	☐ Hercose* AP	☐ Dipentene No. 122*
☐ Nitrocellulose	☐ Dark Wood Rosins	☐ Textac*	☐ Rosin Derivatives
☐ PMC* Chemicals	☐ Casein	☐ Textile Chemicals	

My problem is

Name Title

Company

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*Reg. U. S. Pat. Off. by Hercules Powder Company.

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HERCULES POWDER COMPANY

noteworthy in that they are more easily prepared and applied than ordinary starch finishes, since no heating is required. Due to their thermoplastic properties, the finishes produced are readily regenerated by ironing. Finishes are crystal-clear and indifferent to sunlight, enhancing color value and brightness of dyed or printed fabrics. Combined with required amount of direct color, these emulsions can be used to dye and finish in one operation. The fastness to washing is in general superior to that of fabrics dyed in the conventional dye-bath. Any degree of finish, from very stiff to soft, can be obtained. Hercules Powder Co.

HEXACHLOROPROPENE

C_3Cl_6. M. P., —21° to —24° C.; B. P. 210° C. Sp. Gr. at 15/4° C., 1.688. Heavy, water-white liquid. Properties similar to the unsaturated ethane compounds, perchlorethylene and trichlorethylene. The Dow Chemical Co.

n-HEXALDEHYDE

$CH_3(CH_2)_4CHO$. Colorless liquid possessing a sharp, aldehyde odor. B.P. 128.6° C. The 6 carbon atoms in a straight chain are of interest in many syntheses. Substitution reactions with halogens, reduction with hydrogen, together with other typical aldehyde reactions, make it a valuable starting point in the manufacture of plasticizers, rubber chemicals, dyes, synthetic resins, and insecticides. Carbide and Carbon Chemicals Corp.

HYDROTEX

High concentration, one-bath waterproofing paraffin emulsion. Stable to acids, salts and electrolytes—not affected by hard water. Dilutable with cold water. Contains no soaps or esters. Uses—waterproofing of textiles of all kinds, paper, cardboard, leather, etc., in one-bath processes. The Beacon Co.

HYDROXYETHYL ETHYLENE DIAMINE

$NH_2CH_2CH_2NHCH_2CH_2OH$. Hygroscopic liquid of medium visc. and mildly ammoniacal odor; B.P. 243.7° C. Compound embodies the reactivity of alcohols, primary amines, and secondary amines. Its properties combine the ethanolamine and ethylene amine families, and chemically it is similar to diethylene triamine. Producers of textile compounds, dyestuffs, resins, rubber products, insecticides, and certain medicinals will find it a novel raw material Carbide and Carbon Chemicals Corp.

HYDROXYLAMMONIUM ACID SULFATE

$NH_2OH.H_2SO_4$. As produced, this material is a soft crystalline mass of brownish color. It may be used for the preparation of other hydroxylammonium salts and can also be reacted with aldehydes and ketones to form aldoximes and ketoximes. Commercial Solvents Corp.

HYDROXYLAMMONIUM SULFATE

$(NH_2OH)_2.H_2SO_4$. This salt, which is of high purity, may be used as a reducing agent; the salt can also be reacted with carbonyl compounds, esters, quinones, and the ethylene linkage in unsaturated acids and ketones. Commercial Solvents Corp.

HYDROXYLAMMONIUM SULFATE, TECHNICAL

$(NH_2OH)_2.H_2SO_4$. In addition to the pure grade of Hydroxylammonium sulfate just described, a technical grade is also available which will be found entirely satisfactory for many uses. Commercial Solvents Corp.

INDUSOIL

Mixture of fatty and rosin acids containing phytosterols made from "Liqro" by vacuum distillation. Actual composition not well established. Serves as substitute for Red Oil and other fatty acids in textile oils and soaps, soluble oils, flotation reagents, greases, liquid soaps, polishes, and other soap products. Reacts with glycerol and other polyhydric alcohols forming esters used for paint oils. Industrial Chemical Sales Div., W. Va. Pulp and Paper Co.

IRON DICHROMATE, TECH. (Ferric)

$Fe_2(Cr_2O_7)_3$. Also known as ferric bichromate, acid iron chromate. Reddish-brown granules. Soluble in water. Uses—mfr. coloring materials and stains. Gesing Chem Co.

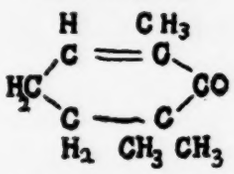
IRON SILICATE (Ferric)

Light brown powder. Insoluble in water; decomposed by acids. Gesing Chem. Co.

ISOBUTYL UNDECYLENAMIDE

$C_{10}H_{19}CONHC_4H_9$. Non-volatile, synthetic organic chemical. Exhibits unusual characteristics as an ingredient of household fly spray. Chemically stable. Extensive tests have shown that it is not harmful to warm-blooded animals. When used with pyrethrum extract, compositions containing it exhibit greater fly-spray efficiency than compositions containing pyrethrum alone. E. I. du Pont de Nemours and Co. (Inc.)

ISOPHORONE



Stable liquid, B.P. 215.2° C. Slightly sol. water; miscible with usual lacquer solvents materials. Nitrocellulose dilution ratio, 5.7 (toluol), 5.1 (xylene)—highest ratios of the usual lacquer solvents. Uses—powerful solvent for "Vinylite" resins, making possible solutions containing as much as 30% solids without risk of gelling; solvent for dyes, lacquers, printing inks, stencil pastes, and roll-coating finishes; intermediate for mfr. many other industrial chemicals; general solvent for oils, fats, gums, and resins. The Barrett Co.

K-383

Colorless, odorless liquid, insol. water; miscible in all proportions in acetone, benzene, carbon tetrachloride and methanol. A toxic of outstanding value in controlling flies, black carpet beetles, bedbugs and other household pests. Now being produced on a commercial scale by The Dow Chemical Co. from native raw materials.

KEROID

Kerosene dispersion of carbon black (25% conc.) for coating green tires prior to vulcanization. Spraying with this product eliminates use of talc, yielding a satin finish on the tire, often making unnecessary its painting before wrapping. United Carbon Co., Inc.

KREBS IMPROVED PIGMENTS

Grit-free, easy-mixing pigments eliminate to a large extent the incirporation difficulties encountered with the older type of dry colors. Use of the new colors permits more capacity, rapid grit elimination and strength development, and minimizes equipment tie-ups. Heretofore, the chemical dry color industry has been concerned chiefly with improving tinctorial values of their products. The color properties are frequently of minor importance compared to what may probably be called "working properties," or those properties which govern the behavior of a pigment during its incorporation into a paint, printing ink, or other system. E. I. du Pont de Nemours and Co. (Inc.)

L-S #115

Light amber liquid. Forms white milky emulsions with water, having remarkable stability toward acids. The Beacon Co.

LIQRO

Mixture of fatty and rosin acids containing phytosterols. Derived from fats and resins in Pine Wood and similar to liquid rosin or Tall Oil. May be refined by distillation or used in the manufacture of low-priced soaps and soap products, asphalt emulsions, cutting oils, flotation reagents, pitches, animal dips and disinfectants and many other products where a low-cost efficient soap base is a requirement. Industrial Chemical Sales Div., W. Va. Pulp and Paper Co.

LIQUID BRIGHT GOLD

A new product developed from standardized materials of definite composition and manufactured under rigid chemical control and, because of this, more suited for the faster modern methods of decoration. The new product has greater coverage, flows more freely, goes on more evenly and dries more satisfactorily. It adheres at relatively low temperatures and withstands firing at higher temperatures. E. I. du Pont de Nemours and Co. (Inc.)

LUPOMIN

Derivative of a diamine, available as a water-soluble salt, in paste or powder form. Use—softener for textiles and other fibrous materials. Jacques Wolf & Co.

LUPOSEC

Emulsion of waxes and acetate of alumina. Liquid, readily dispersible in water. Use—splashproof and water repellent for use on textiles, paper, etc. Jacques Wolf & Co.

LUSTRE STAINS FOR GLASS

A complete line, from delicate pastels to deep tones, of transparent lustre stains which can be applied to clear glass by spray or brush. With them can be produced unusual 2- or 3-tone effects on glassware closely simulating glass which is produced by the more expensive "batch" process. With these colors it is now possible to apply as many colors to the glassware as the decorator may desire. E. I. du Pont de Nemours and Co. (Inc.)

MANNITOL HEXAACETATE

$C_6H_8O_6(CH_3CO)_6$. Colorless, odorless crystals. Nonhygroscopic. M. P. 124° C. Water-insoluble. Stable to mild acids. Hardener for cellulose acetate and nitrocellulose lacquers. Hardening properties in excess of camphor or triphenyl phosphate for cellulose acetate plastics. Gives harder product without increasing molding pressure, thus retarding creep after forming. Use increases opacity. Shipped in 5- and 25-lb. tins, 250-lb. bbls. Atlas Powder Co.

MANNITOL TRIACETONATE

Triisopropylidene mannitol $C_6H_8O_6(C(CH_3)_2)_3$. B. P. 170-175° C. at 25 mm. M. P. 68-69° C. Colorless, odorless crystals. Nonhygroscopic. Sol. most organic solvents; insol. water. Stable to alkalies, sensitive to acids. Used to introduce mannitol into organic solvents, as in rosin soldering flux. Plasticizer for cellulose esters and ethers. Shipped in 5- and 25-lb. tins, 250-lb. bbls. Atlas Powder Co.

MAPICO RED #297

Developed at company's plant in Monmouth Junction, N. J., primarily and essentially for the rubber industry. Analyzes as follows: Fe_2O_3, 99.0%; Mn, less than 0.5%; water-sol. salts, less than 0.25%; ignition loss, less than 0.5%; copper, not over spectroscopic traces; pH, 8.5; sulfates (SO_3), below 0.2%;; no acidity; alkalinity, below 0.0005% as Na_2CO_3; sol. iron salts, below 0.0015%. Tests conducted for aging have proven this color about 10% superior to any other red oxide now on the market. Binney & Smith Co.

MESITYL OXIDE

$(CH_3)_2C{=}CHCOCH_3$. Powerful solvent, partially soluble in water, B.P. 128.0° C.; toluol dilution ratio, 3.8. Dissolves low-viscosity cellulose acetate, polyvinyl chloride, and ethyl cellulose. This unsaturated ketone has dual possibilities as an intermediate, either through reacting the carbonyl group with amines, aldehydes, cyanides, and other families, or by saturating the double bond with halogens and haloid acids. Carbide and Carbon Chemicals Corp.

META-CRESOL

$m\text{-}CH_3C_6H_4OH$. M. W. 108.06. 98-100% grade. Water-white liquid (M. P. 11-12° C.). B. P. 202.8° C. Sol. alcohol; insol. water. Uses—intermediate in mfr. dyestuffs, fungicides, germicides, plastics. Reilly Tar & Chemical Corp.

METHOCEL

Methyl cellulose. A water-soluble cellulose ether with a wide range of application, particu-

For your convenience in asking for more detailed information on any of these products we suggest use of coupon on page 698.

larly in the manufacture of paper, textiles, cosmetics and food products. Readily yields clear, neutral, aqueous solutions of any desired viscosity. Odorless, colorless, and completely non-toxic. Its coatings are grease-proof, tough, and highly flexible. A desirable agent for dispersing, thickening, emulsifying, sizing, and coating. As a molded or extruded product, exhibits strong orientation effects. In cordage form a tensile strength of at least 40,000 lbs./in.^{2} is obtained. The Dow Chemical Co.

METHYL AMYL CARBINOL

$CH_3(CH_2)_4CHOHCH_3$. B.P. 160.4° C. The first heptyl alcohol to be made commercially. This secondary alcohol should be of interest in the manufacture of plasticizers, xanthates and wetting agents; should be tried wherever the use of a medium-boiling alcohol is indicated. Carbide and Carbon Chemicals Corp.

METHYL CYCLOHEXANE

C_7H_{14}. M.W. 98.18. Water-white (less than 20 Hazen) liquid, 95% distilling within 2.0° C.; boiling range, 100.0-103.0° C. Leaves no residue on evaporation, and has no acidity. Water content, less than 0.2%; Sp. Gr. at 25/4° C., 0.763-0.766. Flash point, less than 10° F. Produced by hydrogenating toluol. Used as a solvent for many oils, fats, waxes and other materials, such as crude rubber, bitumen, and ethyl cellulose. May also be used as a degreasing solvent. Lbs. per gal., 6.4. The Barrett Co.

METHYL CYCLOHEXANOL

$C_7H_{14}O$. M.W. 114.18. Water-white (less than 20 Hazen) liquid, 95% distilling within 5.0° C.; boiling range, 169.0-176.0° C. Leaves no residue on evaporation, and has no acidity. Water content, less than 0.2%; Sp. Gr. at 25/4° C., 0.911-0.916. Flash point, approx. 68° C. Principally, a mixture of 2 isomers produced by the hydrogenation of metaparacresol. Uses—solvent for many fats, oils, waxes, natural and synthetic resins; mfr. of emulsion stabilizers, homogenizers, and blending agents; mfr. of soaps, lacquers, plastics, polishes, etc. The Barrett Co.

METHYL CYCLOHEXANONE

$C_7H_{12}O$. M.W. 112.16. Water-white (less than 20 Hazen) liquid, 95% distilling within 4.0° C.; B.P. 165.0-171.0° C. Leaves no residue on evaporation; has no acidity. Water content, less than 0.2%; Sp. Gr. at 25/4° C., 0.910-0.914. Flash P., approx. 53° C. Principally, a mixture of 2 isomers produced by incompletely hydrogenating metaparacresol. Uses—mfr. lacquers, enamels, inks, polishes, resins; solvent for cellulose esters and ethers, crude rubber, oils, fats, waxes, and many natural and synthetic resins. The Barrett Co.

METHYLENE CHLORIDE

CH_2Cl_2. M. P. —96.7° C. B. P. 40.1° C. Sp. Gr. at 20/4°., 1.333. Colorless liquid. with chloroform-like odor. Powerful solvent for fats, oils, resins, lacquers, varnishes, etc., one of the most stable of the chlorinated hydrocarbon solvents. Most metals (e.g., steel, aluminum, copper, tin, and lead) not corroded by it at temperatures up to 100° C. The Dow Chemical Co.

METHYL ISOPROPYL ACETOPHENONE

Used in violet and cassia type odors in perfumes. Can also be used in small amounts of raspberry and similar fruit flavors. Fairmount Chem. Co., Inc.

METHYL OLEATE

Orange-colored ester, faint fatty odor. Sp. Gr. at 28° C., 0.866; dist. range (15 mm.), 200-215° C. Freezing P., below 0° C. Acidity, 4.6-5.3% free fatty acid (equal to about 10.6 mg. KOH per g.). Insol. in water; sol. in oils and organic solvents. Uses—plasticizer; mfr. cleaning and polishing compounds, molding lubricants; softener for leather, rubber, waxes, and resins; varnish remover; dye carrier. Glyco Products Co., Inc.

METHYL STEARATE

Light straw-colored ester, faint fatty odor, freezing at 27° C., and distilling (15 mm.) at 192-216° C. Sp. Gr., 0.862 at 28° C.; acidity, 12 mg. potassium hydroxide/g.—about 6.3-6.6% free fatty acid. Insol. in water; sol. in oils and organic solvents. Uses—plasticizer for various coatings; softener for leather, rubber, waxes, and resins; mfr. cosmetic lipsticks, dye carriers, special lubricants, stencil sheets and carbon paper, duplicating and stamping inks. Glyco Products Co., Inc.

MICROGEL

Contains 50% copper and has improved spreading and adherence properties; has gelatinous structure and very fine particle size. Use—control of persistent fruit and vegetable fungus diseases. Tennessee Corp.

MOLY-BLACK

Deep black, lustrous molybdenum-nickel electroplating finish. Can be applied at moderate cost for production of distinctive decorative finishes for automotive and building hardware, electrical fixtures, tools, art objects and many other articles. The black is deep and durable, holds its color and high lustre outdoors and indoors, being extremely resistant to atmospheric corrosion. E. I. du Pont de Nemours & Co. (Inc.)

MONOALKYL ORTHO-PHOSPHATES

RH_2PO_4. The monomethyl, ethyl, propyl, butyl, and amyl compounds are a homologous series of liquid esters which are soluble in water, giving acid solutions. All are soluble in alcohol and in drying oils (e.g., linseed). The amyl and butyl esters are soluble in mineral oil with the aid of blending agents, e.g., amyl acetate and butyl alcohol. They may be used as substitutes for phosphoric acid in special cases, and form interesting salts. Victor Chem. Works.

MONO-CHLOROTOLUENE

C_7H_7Cl. M. W. 126.5. Sp. Gr. at 25/15° C., 1.075. Boiling range at 760 mm., 158.5-160° C. Chemically stable to water, alkalies and most acids, below 100° C. Clear, colorless liquid, consisting of a mixture of ortho- and para-chlorotoluenes. Uses—chemical synthesis; in rubber processing, as a solvent, etc. Cont.—55-gal. drums (450 lbs. net). Heyden Chem. Co.

MONOSTEARIN

Hard, waxy solid, M.P. 55-57° C. Sp. Gr. at M.P., 0.898; sapon. val., 18.3. Insol. in water; sol. in hot alcohol and organic solvents. Glyco Products Co., Inc.

NAPHTHOL AS DISPERSIBLE

A new addition of a substantive type that disperses rapidly and completely in cold water. National Aniline & Chemical Co., Inc.

NAPHTHOLATE AS

Recent addition of a type affording a convenient and time-saving method for preparing material for naphthol dyeing. Readily and completely sol. water; requires no preliminary boiling with caustic soda to bring it into solution. National Aniline & Chemical Co., Inc.

NEO SPECTRA BEADS

Recently introduced to the paint industry as the dustless form of a high-color carbon black. Eliminated the problem of carbon black flying around the mill room. Especially suited to ball or pebble mill grinding of synthetic finish formulations. Packed in air-tight cans. Cannot pick up moisture during transit as do fluffy types of color blacks. Show the valuable property of softer mill pastes, shorter grinding time, improved grind and stability, compared to a fluffy black in the same color range. Binney & Smith Co.

NEOPRENE LATEX TYPE 57

Water dispersion of neoprene for general use where dry neoprene and neoprene cement compositions are not desired. At present commercial applications involve household gloves, coated canvas work gloves, leather finishes, impregnated asbestos gaskets and adhesives where oil, heat and oxidation resistance is required. E. I. du Pont de Nemours and Co. (Inc.)

NEOPRENE, TYPE G

New type of chloroprene rubber, characterized by almost complete freedom from odor, faster rate of vulcanization and better physical and processing properties as compared with earlier types. Finding wide use in oil-resisting articles for personal wear and use, such as shoe soles and heels, boots, work clothing, sink mats and strainers, household gloves, hot water bottles, hospital sheeting, etc. E. I. du Pont de Nemours and Co. (Inc.)

NEW BLUE ND CONC.

Basic reddish navy blue of the non-dusting type, particularly adapted for the coloring of leather. National Aniline & Chemical Co., Inc.

"NIAPROOF"

A normal aluminum acetate salt. White powder, readily sol. in cold or hot water. Solutions may be heated to boiling without decomposition. Contains 35-37% active available aluminum as oxide equivalent. In solution, pH varies from 5.1 at 32% to 5.4 at 1% concentration, readily lowered by the addition of acetic acid. Uses—Preparation of water repellent treatments for textiles, leather, and paper. Cont.—fiber drs. (5, 10, 25, 60, 100 lbs.); barrels (200 lbs.). Niacet Chemicals Corp.

"NIAPROOF" B

A basic aluminum acetate salt. White powder, readily sol. in hot water, more slowly in cold. Solutions may be heated to boiling without decomposition. Contains 34-37% active available aluminum as oxide equivalent. In solution, pH only varies from 4.7 to 4.8 from 1-30% concentration, is readily lowered by acetic acid. Uses—preparation of water repellent treatments for textiles, leather, and paper. Containers: fiber drums (5, 10, 25, 60, 100 lbs.), bbls (200 lbs.). Niacet Chemicals Corp.

NICKEL ARSENATE, C. P. (Nickelous)

$Ni_3(AsO_4)_2$. M. W. 453.96. Yellowish-green powder. Soluble in acids, insoluble in water. Catalyst. Gesing Chem. Co.

NICKEL BORATE (Pure)

Composition, variable. Green vitreous material. Insoluble in water. Gesing Chem. Co.

NICKEL LAURATE, TECH.

Green, amorphous material. Gesing Chem. Co.

2-NITRO-4-AMINO-TOLUENE

$C_6H_8NO_2$. M. W. 126.13. Gesing Chem. Co.

N-DI-n-BUTYL TOLUENESULFONAMIDE

Pale straw-colored liquid, little if any odor. B.P. (8 mm.), 195-220° C. Sharples Solvents Corp.

N-DI-n-BUTYL UREA

Straw-colored, viscous, odorless liquid. Sp. Gr. at 45° C., 0.937. Sharples Solvents Corp.

N-MONO-n-BUTYL TOLUENESULFONAMIDE

Almost colorless solid, of slight odor. M.P., 41° C.; B.P. (10 mm.), 210-230° C. Sharples Solvents Corp.

2-NITRO-1-BUTANOL

$CH_3CH_2CH(NO_2)CH_2OH$. This compound, liquid at ordinary temperatures, can be distilled under vacuum without difficulty. Readily esterified with organic acids; the esters are stable to heat. However, the esters hydrolyze readily and, in alkaline solutions, react to yield nitrobutylene and the salt of the acid. Having the structure of a secondary nitro compound, it undergoes condensation reactions with aldehydes to form dihydroxy compounds. Commercial Solvents Corp.

NITROETHANE

$CH_3CH_2NO_2$. The reactions of nitroethane are similar to those of nitromethane but are limited by the presence of only 2 rather than 3 reactive hydrogens in the molecule. It forms

Alphabetical list of companies and their addresses whose products are described on these pages is given on pages 711-712.

ethylamine upon reduction. Commercial Solvents Corp.

2-NITRO-2-ETHYL-1,3-PROPANEDIOL

$CH_3OHC(C_2H_5)(NO_2)CH_2OH$. Quite similar to the corresponding methyl derivative described above, but is more soluble in organic solvents. Its M.W. is slightly higher and its M.P. lower than that of the methyl derivative. Commercial Solvents Corp.

NITROMETHANE

CH_3NO_2. The most reactive of the nitroparaffins. Having 3 active hydrogen atoms, it may be condensed with 1, 2, or 3 molecules of an aldehyde to form mono-, di-, or trihydroxy compounds. It can also be reacted with chlorine under proper conditions to form mono-, di-, or trichloromethane. Another reaction involves its reduction to methylamine by catalytic hydrogenation. Commercial Solvents Corp.

2-NITRO-2-METHYL-1-PROPANOL

$CH_3C(NO_2)(CH_3)CH_2OH$. Isomeric with 2-nitro-1-butanol, described above, but the nitro group is attached to a tertiary carbon atom; it therefore varies considerably from the latter compound in its chemical properties. E.g., it cannot be condensed with aldehydes. Also, it is a solid, whereas 2-nitro-1-butanol is liquid at ordinary temperatures. Esters of 2-nitro-2-methyl-1-propanol can be prepared by the usual methods; these are quite stable, being similar in this respect to such compounds as butyl acetate. Commercial Solvents Corp.

2-NITRO-2-METHYL-1,3-PROPANEDIOL

$CH_2OHC(NO_2)(CH_3)CH_2OH$. One of the simplest nitroglycols which can be produced from the nitroparaffins. In its chemical reactions is similar to 2-nitro-2-methyl-1-propanol. Commercial Solvents Corp.

1-NITROPROPANE

$CH_3CH_2CH_2NO_2$. The reactions of this compound are similar to those of nitromethane and nitroethane. It can be reduced to form n-propylamine. Commercial Solvents Corp.

2-NITROPROPANE

$CH_3CHNO_2.CH_3$. Contains only 1 reactive hydrogen and therefore when condensed with an aldehyde it can form only a monohydroxy nitro compound. Likewise, when reacted with chlorine it yields only 2-chloro-2-nitropropane. Commercial Solvents Corp.

NO-DOR

Developed especially to chemically deodorize all odors due to organic decomposition. Pfaltz & Bauer, Inc.

NOHEEV

Silicate of soda (approx. 32.4% Na_2O), designed for use in rotary drilling mud as employed in oil and gas wells as a mud stabilizer. Function is to control the hydrous disintegration of the shale being drilled. Philadelphia Quartz Co.

NYLON AND "EXTON" NYLON FILAMENT

The word "nylon" was coined by the Du Pont Company as its generic name for all material defined scientifically as "synthetic fiber-forming polymeric amides having a protein-like chemical structure; derivable from coal, air and water, or other substances, and characterized by extreme toughness and strength and the peculiar property to be formed into fibers and into various shapes, such as bristles and sheets." Uses—fine hosiery, woven and knit wearing apparel; mfr. sewing thread, fishing line; can be extruded on copper wire as insulation. A single heavy filament form is produced for conversion into such diversified products as "Exton" nylon filament as a substitute for brush bristles.

ORANAP

Sodium salt of isopropyl naphthalene sulfonate in a water-soluble paste form. Use—penetrator and detergent for textiles, etc. The above products are usually furnished in 50-gal. hardwood barrels or drums, but may be purchased in smaller quantities. Jacques Wolf & Co.

OREL

A superior, entirely new lubricant which does not affect rubber in any way. Possesses such penetrating qualities that it goes where ordinary lubricants cannot reach. For this reason it is a perfect anti-squeak for all rubber-to-metal chassis parts; also effective for spring lubrication and other metal-to-metal contacts between the chassis and frame. E. I. du Pont de Nemours and Co. (Inc.)

ORTHOCHLOROBENZALDEHYDE

C_7H_5OCl. M. W. 140.5. Clear, colorless liquid of characteristic aromatic odor. F. P., about 9° C. B. P. at 760 mm., about 212° C. Sp. Gr. 1.245 at 25° C. Uses—dye intermediate; for organic synthesis, and in the plastics trade. Cont.—55-gal. stainless steel drums. Heyden Chem. Corp.

ORTHOCHLOROBENZOTRICHLORIDE

$C_7H_4Cl_4$. M. W. 231. White solid. M. P. 25.4° C. Uses—dye intermediate; in organic synthesis. Cont.—125-lb. carboys. Heyden Chem. Corp.

ORTHOCHLOROBENZOYL CHLORIDE

$C_7H_4O\ Cl_2$. M. W. 176. Colorless liquid. Boiling range at 760 mm., about 118°. F. P. about —6° C. Uses—dye intermediate; for organic synthesis. Cont.—125-lb. glass carboys. Heyden Chem. Corp.

ORTHOCHLOROBENZYL CHLORIDE

$C_7H_6Cl_2$. M. W. 161. Clear, colorless liquid with irritating odor. Boiling range at 760 mm., about 215° C. Sp. Gr. at 25° C., about 1.276. Uses—intermediate for dyes and other organic chemicals. Cont.—125-lb. carboys. Heyden Chem. Corp.

ORTHOCHLOROTOLUENE

C_7H_7Cl. M. W. 126.5. Clear, colorless, mobile liquid. Sp. Gr. at 15/15° C., 1.078. Boiling range at 760 mm., 158.5-159.5° C. Stable to alkaline solutions, dilute acids and most concentrated acids at normal temperatures. Uses—intermediate for dyes and for organic synthesis. Cont.—55-gal. drums. Heyden Chem. Corp.

P-L 825

Light amber liquid emulsifying agent which forms milky emulsions of fair stability towards acids with water. The Beacon Co.

PARACHLOROBENZALDEHYDE

C_7H_5OCl. M. W. 140.5. White, crystalline solid. B. P. at 760 mm., 214° C. F. P., about 44° C. Uses—intermediate for dyes and organic synthesis; raw material for plastics and resins. Cont.—55-gal. stainess steel drums. Heyden Chem. Corp.

PARACHLOROBENZOTRICHLORIDE

$C_7H_4Cl_4$. M. W. 231. Colorless liquid. Boiling range at 760 mm. 245° C. Uses—dye intermediate, for organic synthesis. Cont.—125-lb. carboys. Heyden Chem. Corp.

PARACHLOROBENZOYL CHLORIDE

$C_6H_4OCl_2$. M. W. 176. Boiling range at 760 mm., about 222° C.; at 18 mm., about 111° C. F. P., about 16° C. Uses—dye intermediate and intermediate for organic synthesis. Cont.—125-lb. glass carboys. Heyden Chem. Corp.

PARACHLOROBENZYL CHLORIDE

$C_7H_6Cl_2$. M. W. 161. Clear, colorless liquid. Sp. Gr. at 25° C., 1.26. Boiling range at 760 mm., about 220° C. Uses—dye intermediate; for organic synthesis. Cont.—125-lb. carboys. Heyden Chem. Corp.

PARACHLOROTOLUENE

C_7H_7Cl. M. W. 126.5. Clear, colorless liquid. Sp. Gr. at 15/15° C., 1.065. Boiling range at 760 mm., 161.4-163° C. F. P., not less than 6° C. Chemically stable to practically all acids and alkalies at normal temperatures. Uses—intermediate for dyes and organic synthesis. Cont.—55-gal. iron drums. Heyden Chem. Corp.

PARATEX

Low-cost, one-bath waterproofing paraffin emulsion. Similar in many respects to "Hydrotex." A 4% solution is required in waterproofing. 40% of a 20% aluminum acetate (by weight of "Paratex") is suggested as an addition to the "Paratex" solution in water. The Beacon Co.

PENSAL

Recent improvements have been made in sodium orthosilicate ("Pensal") by screening the material to remove the fine dust that frequently proved objectionable. "Pensal" contains approximately 62½% Na_2O and is without the water present in the usual type of sodium silicate. Penna. Salt Mfg. Co.

PENSAL-M

Recently-developed soap builder, blending together several basic alkalis of known detergent qualities together with water soluble wetting agents. Due to its phosphate and silicate content, is particularly helpful in hard water areas. The wetting agents which it contains increase wettability and add to the detergent qualities of the product. Penna. Salt Mfg. Co.

PENTACHLOROPHENOL

C_6HOCl_5. M. W. 266.4. White, solid or needle-like crystals; crystallizing point, 190.2° C. Very slightly sol. water; insol. aqueous ammonia; sol. in numerous organic solvents. Uses—industrial presevative; agricultural fungicide; wood stain control in lumber, etc.; preservation of pulp and paper, rubber latex, etc.; mfr. fungus-resisting paints. Monsanto Chemical Co.

PENTAERYTHRITOL (Pure)

$C(CH_2OH)_4$. M. W. 136. White, crystalline, odorless powder. M. P. about 250° C. Sol. in water at 20° C., about 1:10. Ash, 0.010% max.; no sulfates or chlorides. Uses—mfr. esters and other derivatives for the pharmaceutical, cosmetic and allied industries; mfr. pentaerythritol tetranitrate, an explosive. Cont.—250-lb. slack bbls. Heyden Chem. Corp.

PENTAERYTHRITOL, TECH.

$C(CH_2OH)_4$. M. W. 136. White, crystalline, odorless powder. M. P., about 210° C. Sol. in water at 20° C., about 1:12. Ash, about 0.25% max.; no sulfate or chloride. Uses—mfr. esters and synthetic resins, and of numerous other technical products. Cont.—250-lb. slack bbls. Heyden Chem. Corp.

PENTAERYTHRITOL

$C(CH_2OH)_4$. White amorphous powder. Sp. Gr., 1.35; M.P., 262° C.; M.P., 180° C.; C.P., 250°. Sol. water; slightly sol. methanol; insol. carbon tetrachloride, ether. Uses—preparation alkyd resins, mfr. explosives; esters used as plasticizers, solvents, separating agents, and lubricants. Grade—tech. Cont.—cartons (5, 25, 50 lbs.), drums (125 lbs.), bbls. (250 lbs.). Niacet Chemicals Corp.

PERCHLORON

Newly developed form of calcium chloride manufactured in such a manner as to remove the dusty particles that, in the past, have been so objectionable to everyone who handles this type of material. Virtually free of all dust, yet the particle size is sufficiently small to give excellent solubility. Penna. Salt Mfg. Co.

PHENOTHIAZINE

$C_6H_4{=}S(NH){=}C_6H_4$. Yellow, crystalline solid; M. P., 180-181° C. Insol. water, benzene or ether; readily sol. acetone. Unstable to oxidizing conditions. Less basic than diphenylamine; does not form salts readily with acids. Uses—parasiticide, particularly for the removal of certain kinds of worms from animals; anti-

For your convenience in asking for more detailed information on any of these products we suggest use of coupon on page 698.

oxidant; intermediate for further synthesis. E. I. du Pont de Nemours and Co. (Inc.)

PHENYL "CELLOSOLVE"

$C_6H_5OC_2H_4OH$. Water-white liquid with faint aromatic odor, B.P. 244.7° C. Partially soluble in water and containing both the ethanol and phenol groups, will dissolve a host of diverse materials. Almost odorless, is effective as a fixative for delicate perfumes in soaps and cosmetics, where high alcohol solubility is an advantage. Stable in the presence of acids and alkalies, remains colorless, and does not become rancid. Its alcohol group makes it a potential intermediate for the synthesis of plasticizers, germicides, perfume materials, and certain pharmaceuticals. Carbide and Carbon Chemicals Corp.

PHENYL DIETHANOLAMINE

$C_6H_5N(CH_2CH_2OH)_2$. Light-colored solid, M.P. 57° C. Completely dissolved by hot water, alcohol, or ether. Of especial interest for the synthesis of dyes for acetate rayon. These are more readily applied to the goods, crock less than other dyes, and possess better water solubility. Azo dyestuffs may also be obtained by condensing it with aromatic aldehydes such as 2-chlorbenzaldehyde. Also of interest in the synthesis of dyes of the indigo type. Being a tertiary amine, it undergoes the usual reactions of this type of amine. Carbide and Carbon Chemicals Corp.

PHENYL ETHANOLAMINE

$C_6H_5NH(CH_2CH_2OH)$. B.P. 268° C. Only slightly soluble in water; dissolved by alcohol and ether. Used chiefly as an intermediate in the preparation of dyestuffs and related compounds. A secondary amine, it may be further alkylated to produce higher boiling tertiary derivatives. Carbide and Carbon Chemicals Corp.

PHORONE

$(CH_3)_2C{=}CHCOCH{=}C(CH_3)_2$. Yellow liquid, B.P. 197.9° C. Has unique freezing point of 28.0° C. Is a nitrocellulose solvent; resembles camphor in many properties. Contains 2 double bonds which combine with reagents which would ordinarily be expected to react only with the carbonyl group. Shows promise as an intermediate for producing rubber chemicals, plasticizers, flotation agents, and inhibitors. Carbide and Carbon Chemicals Corp.

PHTHALIC ANHYDRIDE

$C_8H_4O_3$. M.W. 148.11. White flakes, M.P. 130.7° C. Produced by catalytic oxidation of naphthalene vapor by air at elevated temperatures. Uses—mfr. synthetic resins for the coatings industries; dye intermediates, synthetic flavor and perfume materials, esters, plasticizers, etc. Cont.—wooden bbls., paper-lined, 230 lbs. net. The Barrett Co.

POTASSIUM COBALTICYANIDE, C. P.

$CoK_3(CN)_6$. M. W. 332.37. Yellow crystals. Very soluble in water; insoluble in alcohol. Gesing Chem. Co.

POTASSIUM SILICATE

$K_2O.(SiO_2)3.9$. Weight ratio $SiO_2/K_2O=2.5$. Impurities: traces only of calcium, barium, strontium and sodium oxides. Available in broken lumps and powdered form as well as aqueous solutions. The "No. 30" solution has a gravity of 30° Bé and solids content of 29.0%. Uses—flux coating of welding rods; vehicle for non-efflorescing water-type paints; binder in carbon arcs. Differs from sodium silicate mainly in its freedom from efflorescence. E. I. du Pont de Nemours and Co. (Inc.)

PROPYLENE LAURATE EDIBLE

Of particular interest as an emulsifying agent to manufacturers of cosmetics, pharmaceuticals and foodstuffs, because of its non-toxicity and great degree of purity. Physiologically harmless and definitely edible. Properties: amber oil, self-emulsifiable in water to form milky-white emulsions; non-hygroscopic and high boiling; miscible with alcohol, glycerine, glycol, hydrocarbons, etc.; pH of 5% aqueous dispersion, 8.0; practically odorless; non-toxic and edible. Physiologically harmless. Low surface tension and viscosity. The Beacon Co.

RED PRUSSIATE DOUBLE SALT

$K_3NaFe(CN)_6$. M.W. 313.09. Min. purity, 99.0%. Fine, odorless crystals, decompose before melting. Non-hygroscopic, stable in air at atmospheric temperatures in absence of reducing vapors. Sol. in water: slightly greater than that of $K_3Fe(CN)_6$ (potassium ferricyanide). Use—as a replacement for red prussiate of potash ($K_3Fe(CN)_6$). American Cyanamid & Chem. Corp.

RESINOL

Water-white viscous liquid resin—water sol., miscible with polyhydric alcohols. Entirely non-toxic and non-corrosive. Forms glossy, transparent films which are tacky and non-drying. Finds use in adhesives, especially for "Cellophane"; textile lubricants and softeners; plasticizer for other water-soluble resins; glues, gums; and as bodying agent for cosmetics. The Beacon Co.

RESISTANT COLORS

Decorations for glass available in a wide variety of colors which not only have more brilliance than formerly but remain practically undimmed by contact with the alkalies in household cleaning preparations. Some of these have been used to produce ware which resembles solid-color china. Now widely used in making permanent decorations and labels on glass bottles and other glass packages. E. I. du Pont de Nemours and Co. (Inc.)

RESOLIN

Synthetic resin in powdered form having many of the properties of shellac gum. Forms transparent films of high gloss and extreme hardness. Its water solution dries water-insoluble. Suggested for use in bright-drying wax emulsions, shoe finishes, and water-repellent textile emulsions. The Beacon Co.

1-RHAMNOSE HYDRATE

$CH_3(CHOH)_4CHO.H_2O$. Also known as isodulcite, rhamnodulcite. Monoclinic crystals. M. P. 93-94° C. Sp. rot. $[\alpha]_D^{20}$, 8.56. One of the less common sugars. Gesing Chem. Co.

ROCKRESIN

Cloudy, viscous, water-soluble liquid resin of grayish color. Insol. in every other liquid. Forms glossy, transparent, flexible films which are non-tacky and extremely hard. These films are somewhat harder and more brittle than "Boriresin." Finds special use as a fireproofing agent. The Beacon Co.

RPA No. 3

Crude rubber plasticizing agent; reduces materially the time, labor and power required to prepare rubber for manufacture. In addition, its use facilitates the processing of rubber compounds making possible more uniform and greater production of finished rubber goods. E. I. du Pont de Nemours and Co. (Inc.)

S&W ESTER GUM C

An essentially neutral tri-abietate, insol. in ethyl alcohol, for very pale varnishes and lacquers. Acid No., 4-6; M.P., 87-92° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

S&W ESTER GUM D

An essentially neutral tri-abietate, sol. ethyl alcohol, for pale spirit varnishes and alcohol-type lacquers. Acid No., 90-100; M.P., 70-75° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

S&W ESTER GUM G

An essentially neutral tri-abietate, softer in nature, for lacquer adhesives. Acid No., 10-12; M.P., 55-60° C.; lbs. per gal. at 20° C., 9.2. Stroock & Wittenberg Corp.

SANTOBRITE

Sodium pentachlorophenate. C_6Cl_5ONa. M. W. 288.39. Prepared as round, brownish gray tablets ((about 1 oz. each) with slightly chlorphenolic odor. Moderately soluble in water. Contains 3-4% free alkali (caustic soda). Decomposed by atmospheric carbon dioxide into the active pentachlorophenol, itself water-insoluble. Used principally as the source of pentachlorophenol for sap stain control, in form of a lumber dip. Cont.—7-lb. bags, 10 to an outside container. Monsanto Chemical Co.

SANTOLENE A

Liquid or low-melting solid (B. P., 150-160° C. at 2 mm.), entirely miscible with gasoline in all proportions. Sp. Gr. at 25° C., 1.00. Viscosity at 25° C., 818 centipoises. Less than 0.05% sol. in water. Use—gasoline color stabilizer and antioxidant. Cont.—125-lb. tins, or 55-gal., returnable tinned drums. Monsanto Chemical Co.

SANTOLUBE 31

Essentially, a phosphite of an alkyl phenol. Generally a crystalline solid at room temperature. Melts at 120-130° F. to an oily liquid, of density about 8.6 lbs. per gal. Used as a corrosion inhibitor in lubricating oils designed for protecting cadmium-silver and copper-lead bearings against the action of the fatty acids formed in certain oils under severe service conditions. Usually employed in crankcase oils in concentrations of 0.25% by weight. Cont.—55-gal. galv. non-returnable iron drums (500 lbs. net.) Monsanto Chemical Co.

SANTOLUBE 36

Like "Santolube 31," an inhibitor of bearing corrosion, recommended for use in lubricating oils to protect cadmium-silver and copper-lead bearings against attack by oxidation products formed during the service of the lubricant. It is an oily liquid, an organic compound containing phosphorus, but not a phosphite ester. Cont.—55-gal. non-returnable iron drums (375 lbs. net). Monsanto Chemical Co.

SANTOPOID A

Dark brown, oily, homogeneous liquid; Pour P., below —35° F. Sp. Gr., 1.20-1.30. Viscosity, S. U. at 100° F., 134.5-142.5 seconds. Flash P. (Open Cup), 250° F., min.; Fire P. (Open Cup), 290-300°, min. Use—extreme pressure lubricant base for use in hypoid lubricants as a 10% blend by weight with an oil of the proper viscosity to give the desired final viscosity, etc. Cont.—55-gal., non-returnable iron drums (500 lbs. net). Monsanto Chemical Co.

SASSENE

Blend of aromatic chemicals having an odor value reminiscent of "Sassafras Artificial," developed as a substitute wherever the latter was used for its odor value. Stable in price, and much cheaper than current prices for "Sassafras Artificial." Givaudan-Delawanna, Inc.

SEALACELL W

A durable transparent, penetrating water-repellent sealer and finish, used alone or with subsequent coats of VARNOWAX, or VARNOWAX and G. F. FINISH, to produce highly transparent, satiny finishes revealing the beauty and detail of the grain in all wood. Excellent water repellent for mineral surfaces. Cannot be finished with ordinary varnishes. Cont.—1, 5, 10 gals. (concentrate); 1, 5, 10, 30, 55 gals. (ready-mixed). General Finishes, Inc.

SEALACELL 10

Transparent, penetrating sealer; contains very little wax. Consists of several drying oils, resins, and driers; used as a smooth finish, waterproof coating, and will take varnish and enamel over it as a finish. Cont.—1, 5, 10, 30, 55 gals. (concentrate); 1, 5, 10, 30, 55 gals. (ready-mixed). General Finishes, Inc.

SEALACELL 20

Similar in form and properties to SEALACELL 10, but contains added toxics to impart rot-proofing and insect-proofing properties. Prepared in both ready-mixed and concentrated forms. General Finishes, Inc.

SEALTOX

A recognized wood preservative formulated to the standards of the National Door Manufacturers' Association. Contains penta- and tetrachlorophenols, resin, drying oil, and solvents. Prevents rot, mold, and insect attack in wood. Cont.—1, 5, 10, 30, 55 gals.; tk. cars. General Finishes, Inc.

SODIUM ALKYL PHOSPHATES

$NaRHPO_4$. The sodium salts of monoethyl and amyl o-phosphate are examples of the alkali metal salts which can be prepared from the monoalkyl

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phosphates. They are marketed as concentrated aqueous solutions. They are insoluble in alcohol The ammonium salts as well as the alkali metal salts show promise as general humectants with possible use in several industries. Victor Chem. Works.

SODIUM PHENOLATE (Pure)

NaC_6H_6O. M. W. 116.07. Also called sodium carbolate, sodium phenate, phenol sodium. White, deliquescent mass, rapidly becoming yellow-to-red in air. Very soluble in water. Gesing Chem. Co.

SOLANTINE ORANGE 4RL

Addition to company's line of fast-to-light direct dyes, particularly adapted for coloring cotton-rayon unions dyeing both fibers practically alike. Leaves acetate rayon practically unstained. National Aniline & Chemical Co. Inc.

SOLANTINE ORANGE 5RL

Fast-to-light direct dye yielding, on cotton or rayon, reddish orange shades of excellent fastness to light, water, sea-water and rubbing. National Aniline & Chemical Co., Inc.

SOLANTINE RUBINE LB

Level dyeing bluish-red of superior light fastness and solubility particularly adapted for use in all types of machines. National Aniline & Chemical Co., Inc.

SOLVIT

Viscous amber-colored hydrophilic ester with unique interface-modifying properties. Miscible with oil and aqueous media. Free of nitrogen, sulfur, or phosphorus. Uses—emulsifier in mfr. foodstuffs, pharmaceuticals, cosmetics. The Emulsol Corp.

SORBIDE

A cyclic dihydric alcohol ether of high purity. $C_6H_8O_2(OH)_2$. Colorless, odorless crystals. M. P. 62° C. B. P. 176.5 at 10 mm. Sol. water, lower alcohols, dioxan, chloroform, Hygroscopic. Has 2 aliphatic hydroxyl groups available for reaction to give esters, ethers and halohydrins. Atlas Powder Co.

SORBITAN

A cyclic tetrahydric alcohol ether of high purity. $C_6H_8O(OH)_4$. Colorless crystals, odorless, sweet with bitter after-taste, M. P. 110-111° C. Sol. water, pyridine, acetic acid, lower alcohols, polyhydric alcohols. Has 4 aliphatic hydroxyl groups available for reaction to give esters, ethers, and halohydrins. Shipped in 5- and 25-lb. tins, 250-lb. bbls. Atlas Powder Co.

SORBITOL-GLYCERYL LAURATE

Light amber liquid. Neutral and edible; completely dispersible in water forming milky emulsions whose concentration is easily controlled. Recommended for use in cosmetics, pharmaceuticals, and food products. The Beacon Co.

SORBITOL LAURATE

Light amber liquid. Acid No., 6-7. Nontoxic; completely dispersible in water, forming milky emulsions. Especially fine in cosmetics, pharmaceuticals, and food products. The Beacon Co.

SORBITOL LAURATE

Pale, straw-colored liq., of Sp. Gr., 0.9728, and containing 18-19% free fatty acid. 5% aqueous dispersion has pH of 6.8. Sol. in alcohol, hydrocarbon, mineral, and vegetable oil solvents. Self-emulsifiable with water, should be of interest as a non-toxic, neutral material for the cosmetic, food, and pharmaceutical industries. Glyco Products Co., Inc.

SORBITOL OLEATE

Dark amber liquid. Very fine for forming water-in-oil emulsions. The Beacon Co.

SORBITOL OLEATE

Light orange liq., faint odor, containing 16-17% free fatty acid. Sp. gr., 0.9512; titer, below 0° C. Self-emulsifiable with water, sol. in hydrocarbon, vegetable, and mineral oil solvents; partly sol. in alcohol. Free of taste, and having practically no odor, non-toxic, it is recommended for use in the pharmaceutical, food, and cosmetic industries. Glyco Products Co., Inc.

SORBITOL STEARATE

Cream-colored solid, faint, waxy odor, M. P. 54-55° C. Sp. Grav., 0.960. Dispersible in water, a .3% aqueous dispersion having a pH of 7.7; ester contains 20-21% free fatty acid. Sol. hot hydrocarbon solvents, vegetable and mineral oils. Recommended as emulsifier for cosmetic and pharmaceutical preparations, giving stable paste or cream emulsions with most oils or waxes—emulsions of this type have a lustrous finish. Glyco Products Co., Inc.

SORBITOL TRIACETAL

Triethylidene sorbitol. $C_6H_8O_6(CHCH_3)_3$. B. P. 122-126° C. at 4 mm. n^{D}_{20}=1.4798. Light yellow liquid. Odorless with bitter taste. Slightly hygroscopic. Sol. alcohols, ethers, ketones. esters, amines. Stable to alkalies. Hydrolyzed by acids to sorbitol and acetaldehyde. Plasticizer for cellulose esters and ethers. Suggested for use in imparting alkali resistance to resins and molding compositions. Shipped in 1-, 5-, and 55-gal. containers. Atlas Powder Co.

SPEEDY WAX

Liquid cleaner and wax; cleans automobile finish and gives a wax polish at the same time. Saves time and effort because it does both jobs at once. Intended chiefly for use on new cars and finishes in good condition but gives excellent results on used cars, too. Suitable for synthetic enamels and metallic finishes as well as "Duco," lacquer and baked enamels. E. I. du Pont de Nemours & Co. (Inc.)

STABILIZER G-4 PURE

A diphenyl methane derivative. M.P. 176° C. Very mild taste and odor. Phenol coefficient of Na salt against *E. typhi* and *Staphylococcus aureus*, 90 (20° C.). Sol. alcohol, fatty acids and oils. Use—germicide and fungicide, nontoxic and non-irritating, for pharmaceutical and industrial use. Givaudan-Delawanna, Inc.

STABILIZER G 4-50

Sodium salt of "Stabilizer G-4." Phenol coeff. against *E. typhi*, 57. Mild, phenolic odor; sol. water. Uses—industrial preservative having some fungicidal action. Givaudan-Delawanna, Inc.

STABILIZER G-11 PURE

A diphenyl methane derivative. M.P. 160° C. Very mild taste and odor. Phenol coeff. of Na salt against *Staphylococcus aureus*, 180. Sol. alcohols, ketones, esters. Non-toxic and non-irritating in effective dilutions. Uses—non-volatile germicide for industrial and pharmaceutical use. Givaudan-Delawanna, Inc.

STANNOCHLOR

Anhydrous $SnCl_2$. M.W. 189.6. Sp. Gr., 3.95. Contains higher and more stable stannous tin content than Tin Crystals ($SnCl_2.2H_2O$), 1 lb. of the former being approx. equal to 1¼ lbs. of Tin Crystals. Almost entirely free of any metallic impurities (e.g., iron, lead, copper, antimony, etc.). Keeps indefinitely without deterioration. Cont.—bbls. (400 lbs.), kegs (100 lbs.), drums (50 lbs.). Prior Chemical Corp.

STARCH ACETATE, WATER SOLUBLE

White powder, sol. water; insol. organic solvents. Acetyl value, 9%, equivalent to 20% acetylation available hydroxyl groups. Uses—textile finishes, replacing vegetable gums and pastes; as addition agents to ordinary starch (in confectionery fillings and coatings) as replacement for chrome glue or casein in paper sizes and coatings. Valuable vehicle for dyes; sizing agent in textile printing baths, and stiffening agent for collars, ties, clothing; reagent in sink-and-float process. Cont. cartons, drums, bbls. Niacet Chemicals Corp.

STARCH TRIACETATE

$C_6H_7O_2(OOCCH_3)_3$. White powder, insol. water; sol. organic solvents. Acetyl value, 44%, equal to complete acetylation of available hydroxyl groups. Uses—base for films and coatings. Used and formulated in practically the same manner as cellulose nitrate, acetate, acetate-butyrate, and acetate-propionate, or the benzyl and ethyl cellulose ethers. High and low viscosity types available. Cont.—cartons, drums, bbls. Niacet Chemicals Corp.

STIXSO DD

Specially prepared silicate-of-soda adhesive of closely controlled ratio and viscosity. Of primary interest to the fiber container industry as a ready-to-use, quick-setting adhesive for the manufacture of corrugated paper board. Permits smooth, high-speed board production. Philadelphia Quartz Co.

STRONTIUM CHROMATE, C. P.

$SrCrO_4$. Yellow powder. Slightly soluble in water; easily soluble in hydrochloric, nitric and acetic acids. Gesing Chem. Co.

SULFINDONE BRILLIANT BLUE 3BCF

Addition to the sulfur color line producing on cotton or rayon, bright greenish shades of blue. Readily soluble; possessing good fastness to light and cross dyeing, very good fastness to washing, fulling and perspiration and excellent fastness to acids and alkali. Levels well; particularly valuable for use in pressure machines on raw stock or yarn. National Aniline & Chemical Co., Inc.

SUPERBA BEADS

Combine the unusual grinding properties and good color density of Superba Black with newly-discovered advantages of the pellet form of carbon black. Most striking qualities: freedom from dust and efficiency of ball mill grinding. Widely used for automobile and locomotive finishes, are ground in steel ball or pebble mills. Binney & Smith Co.

SWEET POTATO PULP

A byproduct in the manufacture of Sweet Potato Starch. Approx. analysis: starch, 50%; pectin, 15%; cellulose, 10%; hemi-cellulose, 5%; protein, 2.25%; ash, 4%; moisture, 10%. Used as cattle feed, mixed with high protein and high fat feeds, such as cottonseed meal, to produce a balanced ration; may also be used as a source of pectin. D. Scrivanich & Co.

SWEET POTATO STARCH

White, amorphous, tasteless, odorless powder obtained from American Sweet Potatoes (*Ipomoea Batata*). Protein-free, low ash and remarkably pure root starch, it has colloidal properties akin to those of pectin. Holds moisture tenaciously. Rich in beta-amylose, it pastes and gelatinizes completely at 165° F. and withstands prolonged cooking without thinning out. Uses—puddings and salad dressing; cake and bread baking; confectionery; laundries; finishing and sizing paper and textiles; adhesives; medicinal and toilet preparations, etc. D. Scrivanich & Co.

SYNEKTAN N. C. R.

Chrome salt of sulfonated aromatic compound in liquid form. Use—synthetic tannin for use either alone or as an auxiliary. Jacques Wolf & Co.

SYNEKTAN N. P. P.

Derivative of condensed aromatic compound in liquid form. Use—synthetic tannin for white leather. The above products are usually supplied in barrels containing approximately 500 lbs. net. Jacques Wolf & Co.

TANASOL N. C. O.

Partially neutralized aromatic sulfonic acid in powder form. Use—synthetic auxiliary tanning agent. Jacques Wolf & Co.

TANASOL P. W.

Sodium salt of aromatic sulfonic acid in powder form. Use—bleaching agent for vegetable and chrome leather. Jacques Wolf & Co.

TAR REMOVER

Safe, efficient solvent for removing tar, road oil and gummy substances from automobile finishes. Will not soften, discolor or dull "Duco," or other car finishes. Easy to use—and works quickly. Applied with a soft cloth, and rubbing spots until they disappear. E. I. du Pont de Nemours & Co. (Inc.)

TELLURIUM DIOXIDE, C. P. (Hydrated)

H_2TeO_3 White powder. Soluble in dilute acids and in alkalies; very slightly soluble in water. Gesing Chem. Co.

TETRADECANOL

$C_4H_9CH(C_2H_5)C_2H_4CH(OH)CH_2CH(CH_3)_2$ or 7-ethyl-2-methylundecanol-4. A branched-chain alcohol comparable in molecular size to the so-called fatty alcohols derived from naturally occurring vegetable and animal fats and waxes.

For your convenience in asking for more detailed information on any of these products we suggest use of coupon on page 698.

Mild-odored stable liquid, B.P. 263.2° C. Interesting possibilities as an anti-foam where volatile agents would be lost by evaporating under heat, as a plasticizer intermediate, perfume fixative for soaps and cosmetic preparations, and as a base for the mfr. of wetting agents and detergents. Carbide and Carbon Chemicals Corp.

TETRAETHYLENE GLYCOL

$HO(C_2H_4O)_3C_2H_4OH$. Colorless, hygroscopic liquid, B.P. 327.3° C. Completely soluble in water, but not in benzol, toluol, or gasoline. Good solvent for nitrocellulose. As a general plasticizer, increases pliability and retains flexibility even in dry atmospheres. In its applications, resembles triethylene glycol. Suggested as a resin intermediate, heat transfer medium, and for other uses where advantage can be taken of its high B.P., low vapor pressure, and complete water solubility. Carbide and Carbon Chemicals Corp.

TETRAETHYLENE PENTAMINE

$NH_2(CH_2CH_2NH)_3CH_2CH_2NH_2$ Somewhat viscous, hygroscopic liquid, B.P. 333° C. The lowest priced of the polyethylene amines. Completely sol. in water and most organic solvents; readily dissolves sulfur, acid gases, and various resins and dyes. Can be used to saponify acidic materials, such as fatty acids, to form soaps. Its multiplicity of reactive amine groups makes it unusually interesting to rubber, textile, resin, and dye chemists. Carbide and Carbon Chemicals Corp.

TEXTAC

Trade-name for new, synthetic resin of the thermoplastic type, for use in textile finishing. Used according to established procedures in combination with starch softeners to prepare finishing mixes that improve the quality of the finished fabric without increasing the cost of finishing. Particularly valuable in cotton piece goods finishing and can be used in pure as well as backfilled finishes. Fabrics finished with mixes incorporating Textac have a body and fullness, and a brilliance of color, unobtainable with starch-softener mixes alone. Hercules Powder Co.

THALLIUM CHLORIDE, C. P. (Thallous)

TlCl. M. W. 239.02. White crystalline powder. Slightly soluble in water. Used as a catalyst in chlorination. Gesing Chem. Co.

"TI PURE" O

Krebs Pigment and Color Corp. has recently developed and placed on the market this improved titanium dioxide pigment. For the first time a type of titanium dioxide is available which gives exterior paints and enamels a slow chalking rate and vastly improved resistance to fading—important because it enables paint manufacturers to add to their tinted exterior paints the fine durability characteristic of titanium dioxide, already long utilized in white paints. E. I. du Pont de Nemours and Co. (Inc.).

TRI-BASIC COPPER SULFATE

Contains 54% copper and is water-insol.; of very fine particle size; chemically stable to atmospheric action. Uses—substitute for Bordeaux Mixture in control of citrus fruit and vegetable fungus diseases; used as a 24-hr. dust. Tennessee Corp.

TRIETHYLENE TETRAMINE

$NH_2(C_2H_4NH)_2C_2H_4NH_2$. Moderately viscous, water-soluble liquid, B.P. 277.5° C. Less volatile than diethylene triamine but resembles it in many other properties. Combined with fatty acids, it forms detergents and softening agents. This straight-chain compound possesses a multiplicity of reactive amino groups; offers unusual possibilities in the synthesis of rubber accelerators, pharmaceuticals and dyestuffs. Carbide and Carbon Chemicals Corp.

TRIGLYCOL DICHLORIDE

$Cl(C_2H_4O)_2C_2H_4Cl$. Colorless, water-insoluble, high-boiling (241.3° C.) liquid. Useful as a chlorinated solvent and extractant because of excellent dissolving power for oils and hydrocarbons. Shows promise wherever low volatility is desired, as for plasticizer applications. Like other organic chlorides, it reacts with NH_3 to form amines, with cyanides to form nitriles which are starting points in synthesis of mono- and dicarboxylic acids; has also numerous possibilities as an intermediate for making dyes, resins, or insecticides. Carbide and Carbon Chemicals Corp.

TRIISOPROPANOLAMINE

$(CH_3CHOHCH_2)_3N$. Crystalline, pure-white solid; a mild, water-soluble base. M.P. 45.0° C.; B.P. 188.0° C. (10 mm.). A mixture of isopropanolamines liquid at room temperature is also available. The isopropanolamines readily form stable, non-darkening soaps that are excellent emulsifying agents completely soluble in hydrocarbons. Should be investigated by oil, soap, cosmetic, and pharmaceutical chemists. Carbide and Carbon Chemicals Corp.

TRIS(HYDROXYMETHYL)AMINOMETHANE

$NH_2C(CH_2OH)_3$. While quite soluble in water, this compound is only slightly soluble in alcohols and is insoluble in aromatic and aliphatic hydrocarbons. Commercial Solvents Corp.

TRIS(HYDROXYMETHYL)NITROMETHANE

$NO_2C(CH_2OH)_3$. Esters of this compound can be prepared by the usual methods and these esters are quite stable to hydrolysis and can be distilled satisfactorily under vacuum. Quite soluble in water and alcohols but practically insoluble in aromatic and aliphatic hydrocarbons. Commercial Solvents Corp.

UNDECANOL

$C_4H_9CH(C_2H_4)C_2H_4CH(OH)CH_3$; also called 5-ethylnonanol-2. A new synthetic, secondary alcohol containing 11 carbon atoms. Mild-odored, stable liquid, B.P. 225.4° C.; practically insol. in water. Used as an anti-foam agent, especially where high temperatures are encountered, and as an intermediate for the synthesis of plasticizers, perfume esters, cosmetic bases, certain pharmaceuticals and other compounds. Carbide and Carbon Chemicals Corp.

V-90

A new baking acid—a heat-treated, anhydrous monocalcium phosphate having a continuous, autogenous, substantially water-insoluble coating. This coating retards the dissolving of the phosphate in a batter or dough, thus delaying the liberation of the leavening gas from bicarbonate of soda until the doughs are formed; more efficient utilization of the leavening gas results, and oven products of better volume, texture, and lightness are obtained. Victor Chem. Wks.

VACATONE

By-product of dried yeast and molasses. Contains riboflavin and pantothenic acid, and used in formulation of vitamin-bearing stock and poultry feeds. U. S. Industrial Chemicals, Inc.

VANADIUM PENTOXIDE, C. P. (Anhydrous)

V_2O_5. Yellow powder. Soluble in concentrated acids and alkalies; insol. in water. Gesing Chem. Co.

VARNOWAX

A durable, transparent, penetrating type of finish, producing a soft lustre. Not subject to discoloration, chalking, checking, etc. Consists of SEALACELL W blended with a tung oil-synthetic resin varnish and solvents. Cont.—quarts, 1, 5 gals. General Finishes, Inc.

VAT PRINTING BLACK G DOUBLE PASTE

Vat printing black of good light fastness and very good fastness to washing, boiling soap, boiling soda, peroxide bleach and chlorine. On cotton or rayon, produces full black shades of excellent fastness to perspiration, acid, alkali and hot pressing. National Aniline & Chemical Co., Inc.

VICTOR WETTING AGENT No. 35-A

Similar to "Wetting Agent No. 58-A" in properties, but of different composition. Its solutions exhibit little tendency to foam. Victor Chem. Wks.

VICTOR WETTING AGENT No. 58-A

Wax-like solid giving neutral solutions in water. A highly active surface-tension reducing agent, emulsifier, and wetting-out agent. Concentrations as low as 0.20% will give sinking times of less than 10 seconds in distilled water by the Draves test; effectiveness is approximately the same in the presence of 5% caustic soda or sulfuric acid. Victor Chem. Works.

VINYL ACETATE

$CH_3—COO—CH=CH_2$. Sp. Gr., 0.9335 to 0.9345 at 20/20° C., B.P., 72.5° C. Colorless mobile liq. stabilized with a copper salt to prevent spontaneous polymerization, accounting for the blue color. Uses—preparation of polyvinyl acetal used in mfr. of transparent resins and plastics, safety glass adhesives, surface coatings, stiffeners, textile sizing and impregnating agents, phonograph records, cements, inks and copolymers with other vinyl derivatives, styrene, and acrylic acid, its esters, and derivatives. Cont.—drums (55, 110-gal.), tk. cars (8,000 gal.). Niacet Chemicals Corp.

WF-125

Edible emulsifying agent, particularly useful in the manufacture of cosmetics, pharmaceuticals, and foodstuffs. Forms white, milky emulsions with water. The Beacon Co.

WETSIT, CONC.

Sodium salt of a sulfonated substituted aromatic compound. Clear liquid, containing solvents soluble in water. Use—penetrant and detergent for use on textiles. Jacques Wolf & Co.

"ZEREX"

High-boiling, non-evaporating anti-freeze, made from ethylene glycol. Contains special ingredients to protect against rust and corrosion caused by water. Can be used with high-opening thermostats for high temperature operation and will not attack rubber hose, pump packing, gaskets, or aluminum cylinder heads. Mixes perfectly with water, flows freely, transfers heat efficiently and will not mar car finishes. E. I. du Pont de Nemours and Co. (Inc.)

ZINC HYDROSULFITE

ZnS_2O_4. Powerful reducing agent developed for brightening paper products, particularly those containing groundwood, but applicable to other fibrous materials. Is a white powder not completely soluble in water, and reacts more slowly than sodium hydrosulfite, but is more stable. The Dow Chemical Co.

ZINC SILICATE, ORTHO (C. P.)

White powder. Insoluble in water. Gesing Chem. Co.

ZINOL

Liquid zinc resinate containing 64.0% solids, 4.7% combined zinc. Sp. Gr. at 15.5° C., 0.982; viscosity (Gardner-Holdt) at 25° C., "K"; acid no., 6-10; color, 5L or better. Used as drying agent, dispersing and wetting agent for pigments; mfr. paints, varnishes, and printing inks; helps to eliminate skinning and wrinkling, improve the gloss and adhesion of a film; excellent dispersing agent for oil gels. Cont.—55-gal. galv. drums. General Naval Stores Div., Newport Industries, Inc.

ZIREX

Solid zinc resinate; M.P. 130-135° C.; 9.6% combined zinc. Sp. gr. at 25° C., 1.162; acid no., 0-; color, "N." Used in paint, varnish and printing ink trades, as drying aid promoting pigment wetting and dispersion, helping to eliminate skinning and wrinkling and to inhibit loss of drying strength when used with usual drier combinations. Cont.—500-lb. galv. drums, non-ret. General Naval Stores Div., Newport Industries, Inc.

ZITRO

Solid zinc resinate; M.P. 130-135° C. Sp. gr. at 25° C., 1.130; acid no., 15; color, "N"; 4.8% metallic zinc combined. Used in paint, varnish, and printing ink industries as an aid to complete drying, particularly in conjunction with synthetic resins, and to promote pigment wetting and dispersion; used with usual drier combinations, inhibits loss of drying strength; used with cobalt, makes a paler varnish than other metal-cobalt combinations. Cont.—500-lb. galv. drums, non-ret. General Naval Stores Div., Newport Industries, Inc.

Alphabetical list of companies and their addresses whose products are described on these pages is given on pages 711-712.

Names and Addresses of Companies Whose New Products Are Described in This Catalog

American Colloid Co.,
363 W. Superior St.,
Chicago, Ill.

American Cyanamid & Chemical Corp.,
30 Rockefeller Plaza
N. Y. City

Atlas Powder Co.,
Wilmington, Del.

The Barrett Co.,
40 Rector St.,
N. Y. City

The Beacon Co.,
89 Bickford St.,
Boston, Mass.

Binney & Smith Co.,
41 E. 42nd St.,
N. Y. City

Calco Chem. Division, American Cyanamid Co.,
Bound Brook, N. J.

Carbide and Carbon Chemicals Corp.,
30 E. 42nd St.,
N. Y. City

Commercial Solvents Corp.,
17 E. 42nd St.,
N. Y. City

The Dicalite Co.,
120 Wall St.,
N. Y. City

The Dow Chemical Co.,
Midland, Mich.

Du Pont de Nemours and Co., (Inc.), E. I.
Wilmington, Del.

The Emulsol Corp.,
59 E. Madison St.,
Chicago, Ill.

Fairmount Chemical Co., Inc.,
600 Ferry St.,
Newark, N. J.

General Finishes, Inc.,
1951 University Ave.,
St. Paul, Minn.

General Naval Stores Division,
Newport Industries, Inc.,
230 Park Ave.,
N. Y. City

Gesing Chemical Co., Inc.,
21 Dunham Place,
Brooklyn, N. Y.

Givaudan-Delawanna, Inc.,
80 Fifth Ave.,
N. Y. City

Glyco Products Co., Inc.,
148 Lafayette St.,
N. Y. City

Harris-Seybold-Potter Co.,
Cleveland, O.

Hercules Powder Co.,
Delaware Trust Bldg.,
Wilmington, Del.

Heyden Chemical Corp.,
50 Union Square,
N. Y. City

Industrial Chem. Sales Division,
W. Va. Pulp and Paper Co.,
230 Park Ave.,
N. Y. City

Johns-Manville Corp.,
22 E. 40th St.,
N. Y. City

Michel Export Co., Inc.,
95 Broad St.,
N. Y. City

Monsanto Chemical Company,
1700 S. 2nd St.,
St. Louis, Mo.

Monsanto Chem. Co., Merrimac Division,
Everett Station, Boston, Mass.

National Aniline & Chem. Co., Inc.,
40 Rector St.,
N. Y. City

National Rosin Oil & Size Co.,
1270 6th Ave.,
N. Y. City

Niacet Chemicals Corp.,
4750 Pine Ave.,
Niagara Falls, N. Y.

Pennsylvania Salt Mfg. Co.,
1000 Widener Bldg.,
Phila., Pa.

Pfaltz & Bauer, Inc.,
350 Fifth Ave.,
N. Y. City

Philadelphia Quartz Co., 125 S. 3rd St., Phila., Pa.

Prior Chemical Corp., 420 Lexington Ave., N. Y. City

Reilly Tar & Chemical Corp., Merchants' Bank Bldg., Indianapolis, Ind.

Scrivanich & Co., D., 5920 Jefferson St., Phila., Pa.

Sharples Solvents Corp., 23rd and Westmoreland Sts., Phila., Pa.

Stroock & Wittenberg Corp., 60 E. 42nd St., N. Y. City

The Tennessee Corp., 621 Grant Bldg., Atlanta, Ga.

United Carbon Co., P. O. Box 1475, Charleston, W. Va.

U. S. Industrial Chemicals, Inc., 60 E. 42nd St., N. Y. City

Victor Chemical Works, 141 W. Jackson Blvd., Chicago, Ill.

Virginia-Carolina Chem. Corp., Richmond Trust Bldg., Richmond, Va.

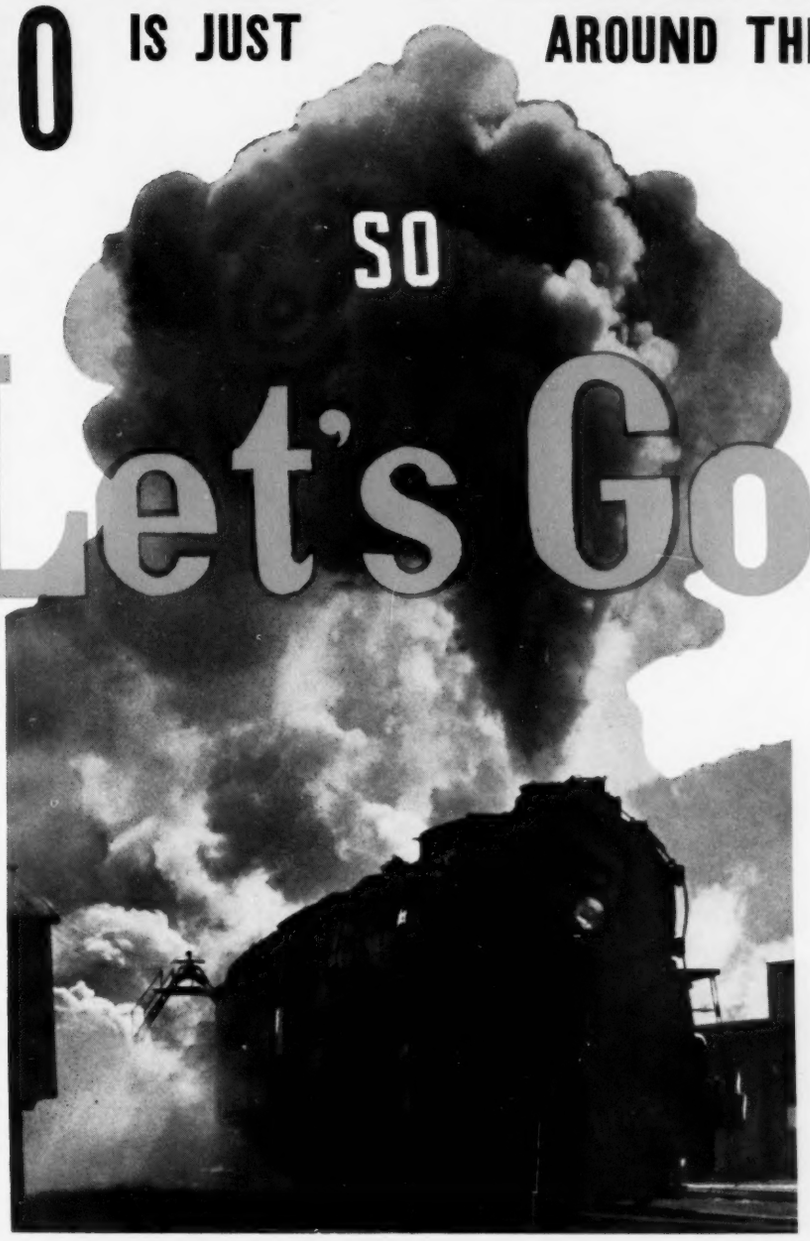
Wolf & Co., Jacques, 350 Lexington Ave., Passaic, N. J.

HIGH AWARD FOR REFRIGERATOR DOOR LINER IN PLASTICS COMPETITION

Stronger than cast iron, yet much lighter in weight, is a refrigerator door liner made of Micarta and laminated with Beetle urea resin, that won a high award in the 4th Annual *Modern Plastics Magazine* Competition. Fitted snugly, and locked securely against an outer steel shell, the plastic door liner helps to keep cold inside and heat outside the refrigerator. Molded to shape by the Micarta Division of Westinghouse Electric and Manufacturing Company, Trafford, Pa.

Above, right: When dinner is served in the open, with temperatures sixty degrees below zero, drivers of the dog sleds attached to the U. S. Antarctic Expedition, commanded by Rear Admiral Richard E. Byrd, will sit down to a table complete with colorful dishes, plates, cups and spoons. This reminder of the comforts at the base camps is possible by the use of Beetleware—a lightweight, plastic material that will be carried in the Trail Boxes of each sled. The Beetleware used by the the Byrd Expedition is made from urea plastics supplied by the Beetle Products Division, American Cyanamid, and was molded by Northern Industrial Chemicals, Inc., Boston, Mass. Enough Beetleware for each sled team was loaded upon the North Star supply ship of the Expedition, which sailed from Boston for Antarctica recently.

1940 IS JUST AROUND THE CORNER



JANUARY First, 1940, will mark the beginning of our 124th year in the business of furnishing reliable Industrial Chemicals, Gums, Waxes and Allied Products, backed by good and efficient service, to our customers in American Industry.

● This seems a good time to reiterate our policy of continuing prices based on actual market values—and not on (probably unwarranted) anticipation of shortages to come ● We will continue to render the trade the best service within our power ● As we see it, this policy of sound service cannot be reconciled with the handling of "Protective Purchases" far in excess of actual production requirements ● We believe that this policy is to your interest no less than our own—and that your cooperation will return you sound dividends ● We want no "War Booms"—to be followed by disruption of business and eventual collapse ● Together, you and we are entering a New Year ● Our country is favored indeed—in raw materials, industrial and financial resources—and the will to live at peace and to carry on constructively ● So..... LET'S GO!

CAUSTIC POTASH • CAUSTIC SODA
IRON CHLORIDE • CHLORIDE OF LIME
CARBONATE OF POTASH
LARVACIDE (Chlorpicrin) Fumigant
RUBBERMAKERS' LIME and other
ELECTROCHEMICAL PRODUCTS
Complete line of GUMS and WAXES—also
LEATHER FINISHES and SIZES—and
ISCO TRINITY TALC
Domestic—superior quality

INNIS, SPEIDEN & CO.

Established 1816

117 LIBERTY ST. NEW YORK

CHICAGO • CLEVELAND • BOSTON • PHILADELPHIA • GLOVERSVILLE N. Y.

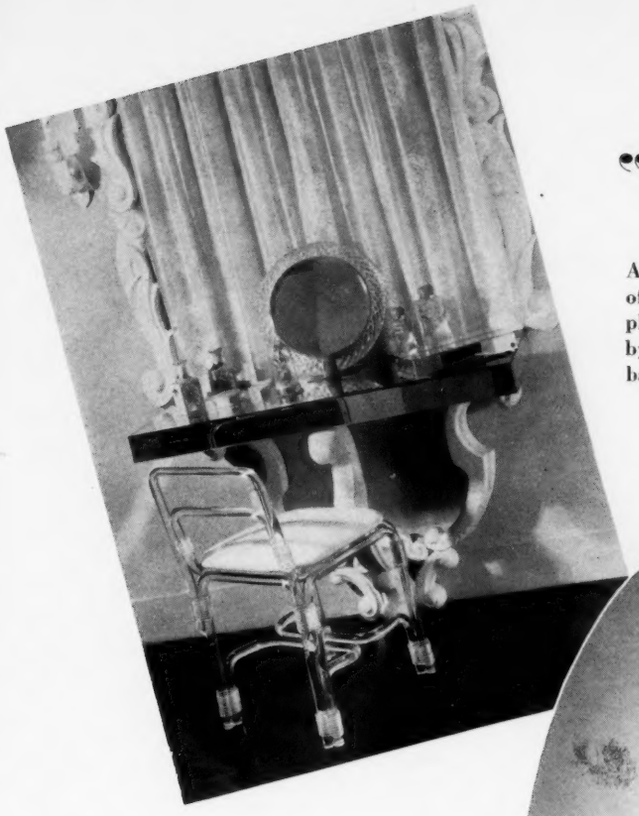
To Our Friends Everywhere

Holiday Greetings and Sincere Good Wishes for the future .....

PRIOR CHEMICAL CORPORATION

NEW YORK - CHICAGO

"This Age of Synthetics"



A boudoir chair with frame made entirely of "Lucite" methyl methacrylate, a du Pont plastic of crystal clarity, has been designed by Dave Swedlow. Shown at the left in a baroque setting at W. & J. Sloane, N. Y. City.

Test Tube Princess makes Bow at Boston: "Princess Plastics" in the person of Miss Dorothy McBride of N. Y. City, wears a hat made of cotton cellulose, jewelry fashioned out of coal, air and water, nylon stockings derived from coal, and she carries a coal-water-air plastic walking stick. Wearing 15 articles made of plastics, the Princess was presented by the du Pont Company at the Boston Conference on Distribution to show how, next to the automobile industry, the American woman is the principal customer of the new plastics industry.

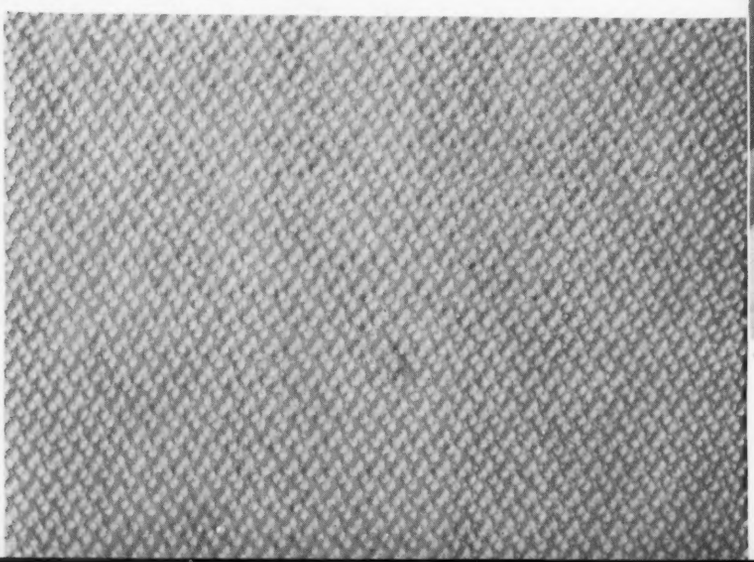
Besides Miss June Stewart, we see displayed here the latest in bicycle streamlining. Ample protection against dust, rain and air resistance is provided cyclists by the "Bronco" Bike Shield, made by the International Mfg. Co. of Boston, from Monsanto Cellulose Nitrate.

First firm to experiment with plastics as a substitute for leather is S. Buchsbaum Co., a Chicago manufacturer of men's furnishings. Recently Buchsbaum announced a line of belts, braces and garters—all made from a plastic which they have named "Elastic-Glass." Later they may use it in their luggage, handbags and other merchandise.

The Crystal Case of Tomorrow manufactured by Pittsburgh Plate Glass for radio station KDKA's new transmitting building. Shown examining case and recordings to be deposited are George H. Bucher, President, Westinghouse Electric & Manufacturing; H. S. Wherrett, President, Pittsburgh Plate Glass; and S. D. Gregory, General Manager, Westinghouse Radio Station KDKA. The Hi-Test Laminated Document Glass used in construction of the case combines the safety factors of Hi-Test automobile safety glass with the light filtering properties of ordinary document glass. It effectively filters out the ultra-violet rays that cause deterioration of paper and inks. This special glass essentially is a "double deck" sandwich in which three pieces of glass, each one-quarter inch thick, form the "toast" and two thin sheets of vinal plastic the "meat."

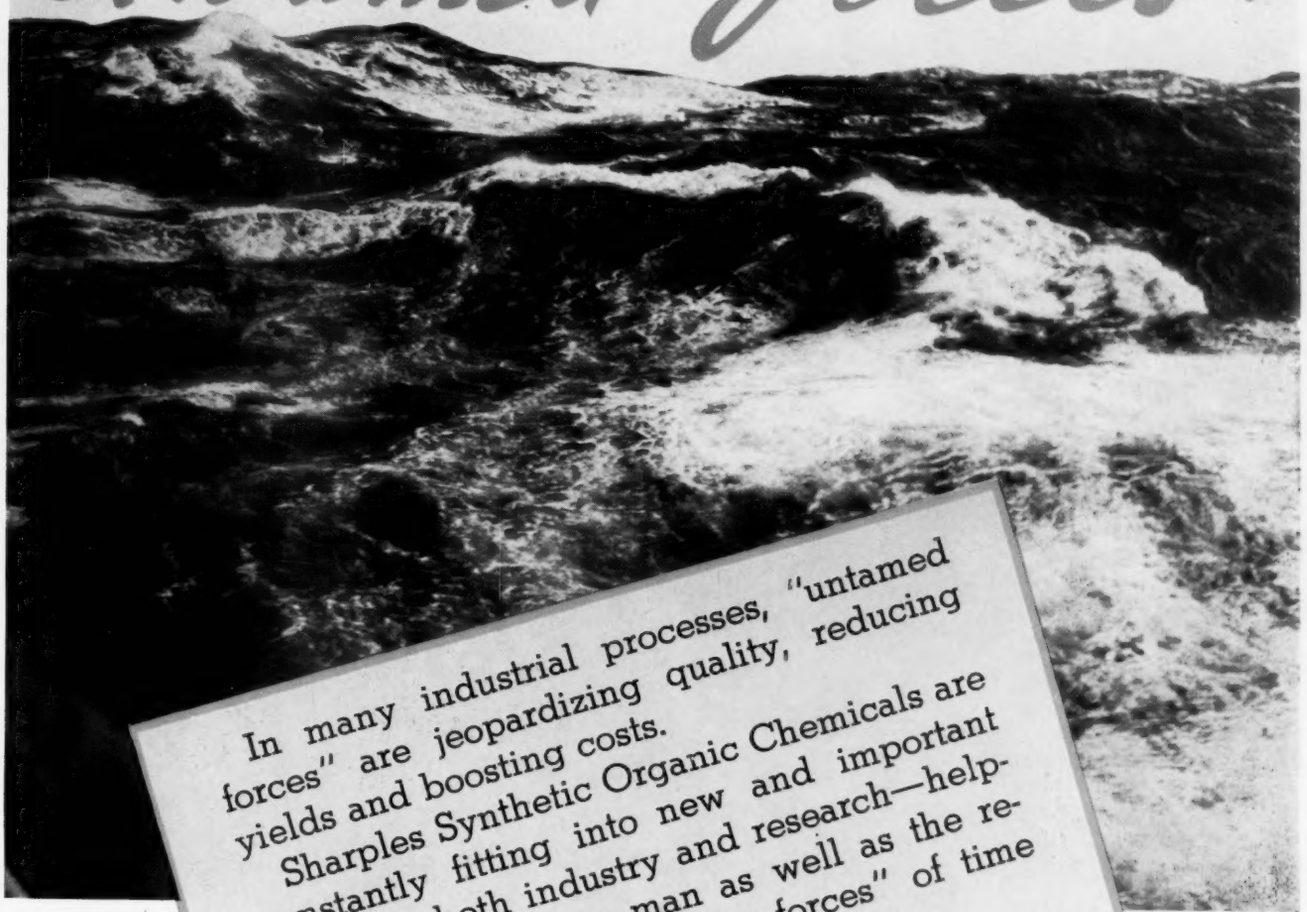
The Chemical Industry Medal for '39 was presented to Dr. Robert E. Wilson (center) at the Chemists' Club, N. Y. City, on Nov. 10. Left, Dr. Wallace Cohoe who presided, Dr. Thomas Midgley, Jr., who spoke on the personal side of the medallist's life, and right, Dr. Bruce K. Brown who spoke on the medallist's technical achievements.

Photograph of the Filtration Fabrics made by Wellington Sears from the new Vinyon fiber yarn. This photograph shows the fabric's actual size. Various size fabrics are available.



A Pill at a Time: It is easy to see at any time how many pills there are in the "one-at-a-time" pill-box devised by Brisbane Box Corp., Detroit—instantaneous visibility is due to the use of Bakelite transparent polystyrene. Molded by Roland D. Place.

Untamed Forces..



In many industrial processes, "untamed forces" are jeopardizing quality, reducing yields and boosting costs.

Sharples Synthetic Organic Chemicals are constantly fitting into new and important places in both industry and research—helping the production man as well as the research chemist "tame the forces" of time and expense.

Why not see if they can help you?

SHARPLES TRADE MARK SOLVENTS

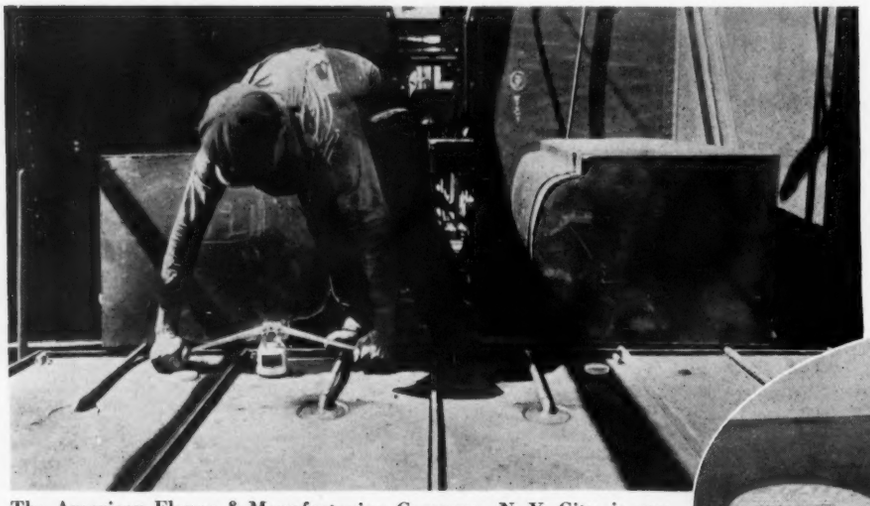
*Pentasol (Pure Amyl Alcohol)
*Pent-Acetate (100% Amyl)
Normal Butyl Carbinol
Isobutyl Carbinol
Sec-Butyl Carbinol
Diethyl Carbinol
Dimethyl Ethyl Carbinol
Tertiary Amyl Alcohol
*Pentaphen
(p-Tertiary Amyl Phenol)
Diamyl Phenol
Ortho Amyl Phenol
Monoamylamine

Diamylamine
Triamylamine
n-Monobutylamine
n-Dibutylamine
n-Tributylamine
Monoethylamine
Diethylamine
Triethylamine
Monoamyl Naphthalene
Diamyl Naphthalene
Polyamyl Naphthalenes
Mixed Amyl Naphthalenes
Normal Amyl Chloride

Normal Butyl Chloride
Mixed Amyl Chlorides
Dichloropentanes
Amyl Mercaptan
Diamyl Sulphide
*Pentalarm
Amylenes
Diamylene
Amyl Benzenes
Diamyl Ether
SEMI-COMMERCIAL PRODUCTS
LABORATORY PRODUCTS
*Trade Mark Registered

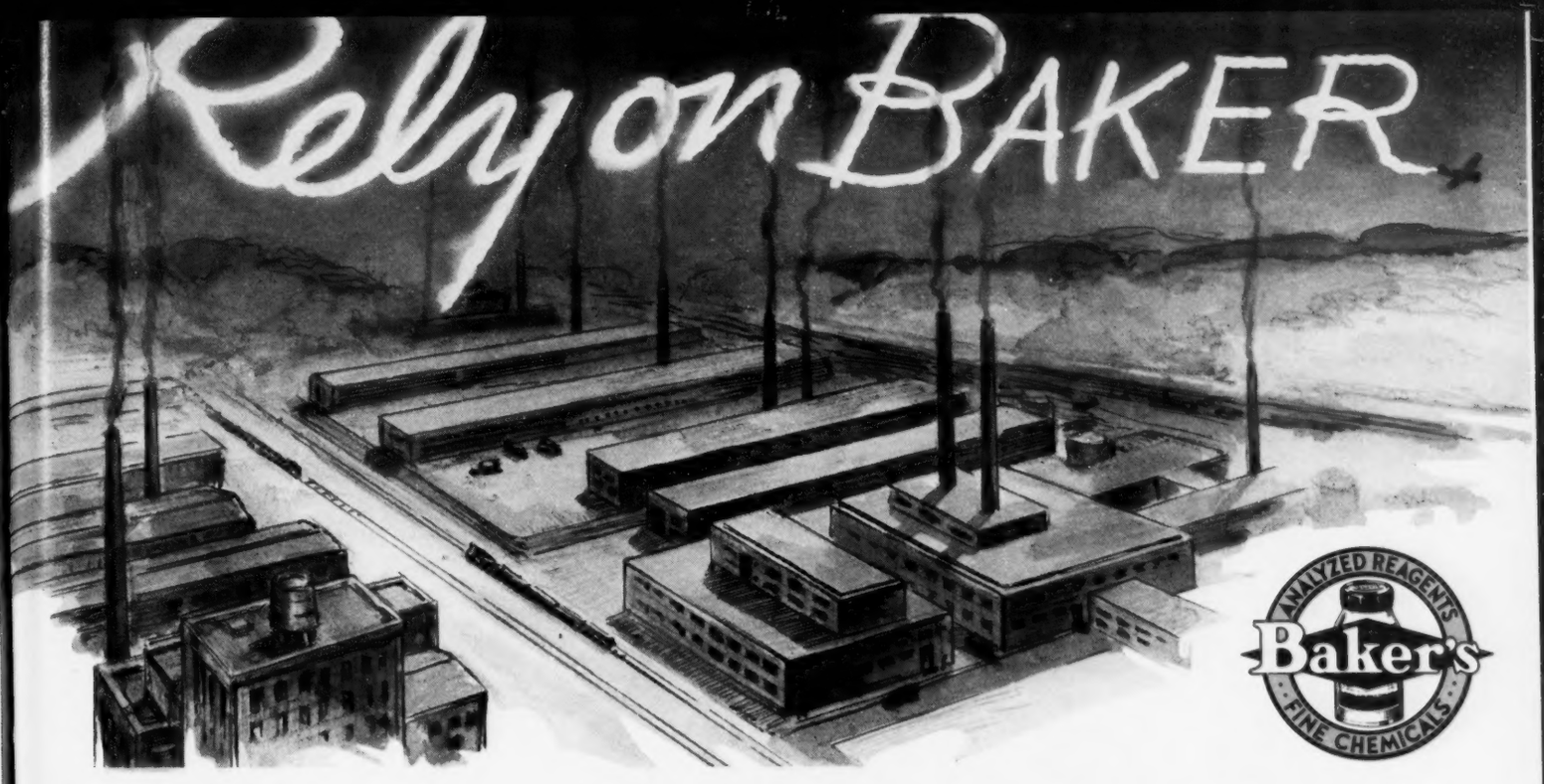
THE SHARPLES SOLVENTS CORP.
PHILADELPHIA
CHICAGO
NEW YORK

Above, marking of snow fields with carbon black dropped from photographic planes will be undertaken by the U. S. Antarctic Service. Left, A 5-passenger airplane carried atop this huge Snow Cruiser will drop black bombs on the snow when taking aerial photographs. Right, Uncompressed Carbon Black, in air-tight tins, donated by the Continental Carbon Company, is loaded aboard the North Star supply ship of the Expedition.



The American Flange & Manufacturing Company, N. Y. City, is one of the cooperators in the "Snow Cruiser" project in connection with the forthcoming Byrd Antarctic Expedition, it has been announced. The company is furnishing all the tanks, including the fuel tanks, equipped with "Tri-Sure" closures for the huge vehicle.

The cruiser is an automotive unit 55 feet in length, having 4 pneumatic tires each 10 feet in diameter and nearly a yard in cross section. It has a 20-foot wheel base, is 15 feet wide, and is powered by means of two diesel engines generating power for electric motors on each of the 4 wheels. It carries sufficient fuel to enable it to cruise between 5 and 6 thousand miles. This fuel supply is stored in several large tanks, each of which will be sealed with "Tri-Sure" closures to prevent contamination and evaporation.



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It is not unusual for a manufacturer to submit his entire problem to us. In cases of this kind we willingly contribute the combined knowledge of our Technical, Executive, and Manufacturing Staffs to the end that the customer's special requirements may be met.

Many of these special formula chemicals are manufactured under code number. In such cases, the names of these chemicals never appear on our records. We do this as a protection to our customer.

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News Review of the Month

"CHEM ENGINEERS" RE-ELECT JONES

Institute Holds Highly Successful Meeting at Providence—Clark S. Robinson, M. I. T., Reveals How U. S. Government Will Control American Chemical Industry In Time of War —Brown, Downs, Newman, and Perry Elected Directors—

HOW the United States Government will control American chemical industry in time of war, and how this will restrict production for normal peacetime purposes of many of our common chemicals, was told by Clark S. Robinson, professor of chemical engineering at M. I. T., in a talk before the 32nd Annual Meeting of the American Institute of Chemical Engineers, held at Providence, R. I., Nov. 15-17.

Our so-called "strategic" war materials, which are those that come mostly from overseas, and which if cut off by blockade would seriously affect our national defense, consist of rubber, aluminum, antimony, chromium, coconut shell charcoal, ferro-manganese, manilla fiber, mercury, mica, nickel, optical glass, quartz crystals, quinine, silk, tin, tungsten, and wool, said Mr. Robinson.

As our less-vulnerable "Critical" materials, which are those produced in this country but in insufficient amount for war purposes and civil purposes combined, so that restricted civil use would have to be made to procure enough for military use, Mr. Robinson named the following: asbestos, cadmium, coffee, cork, cryolite, flaxseed, fluorspar, graphite, hides, iodine, kapok, nux vomica, opium, phenol, picric acid, platinum, scientific glass, tanning materials, titanium, toluene and vanadium.

All of these have important peacetime use which would suffer as a result of the war demand. Phenol, for example, is being used in making synthetic plastics and as a disinfectant, titanium for the manufacture of white pigments for paints, opium and nux vomica for the preparation of important medicinal drugs.

The list of essential chemicals which will be required in large amounts by the Army and Navy for the manufacture of explosives and war agents is a considerable one, according to Mr. Robinson. It includes acetic acid, acetone, ammonia, benzene, caustic soda, chlorine, grain alcohol, wood alcohol, hydrochloric acid, nitric acid, sulfuric acid, picric acid, phenol, potash, soda ash and toluene.

Quoting Mr. Robinson:

"The bulk of these chemicals go into the manufacture of explosives of various sorts and chemical agents. Practically all modern explosives are mixtures of nitrated organic compounds which require the use of sulfuric and nitric acids in their manufacture. Ammonia goes into ammonium nitrate, which is likely to be most widely used in high explosives, and into ammonium picrate which is used in armor piercing projectiles because of its insensitive character. Acetone, acetic acid, and the alcohols are used as solvents for lacquers, plastics, and smokeless powder. Chlorine is the basic raw material used in the synthesis of most chemical war agents such as mustard gas and chlorpicrin. Toluene is the basis for the famous T.N.T. and is largely used in other, less widely known, explosives.

"Many of these chemicals cannot be used for the manufacture of munitions in their usual commercial purity and must be subjected to additional purification to meet Army and Navy specifications. This is because ammunition is subjected to extremes of temperature and humidity and must function perfectly. It is no exaggeration to say that many of the fires and explosions which have occurred at one time or another in munitions plants and storage depots have been due to materials which have been insufficiently purified.

Dean Webster N. Jones, president of the A. I. Ch. E., joins A. E. Marshall, president of Rumford Chemical Works, and a past president of the Institute, in examining a replica of the apparatus used by Count Rumford in 1795 for the measurement of heat transfer. The instrument, exactly copied from the original in possession of the Royal Institution of Great Britain, has been presented by the Institution to the new Rumford Museum, Rumford, R. I.

"All of the chemicals on the above list of essentials are produced in this country, but phenol, picric acid, and toluene are not produced in sufficient amount to supply the wartime needs of the Government in addition to the civilian requirements.

"Of these three, toluene is the most conspicuous. The only sure source of this critical material in any reasonable amount are the byproduct coke ovens. When running at full capacity, these ovens will produce a huge amount of crude toluene which, however, must be highly refined before it can be successfully nitrated for ammunition purposes.

"None of the chemicals listed is used in ammunition as such but is a raw material for the manufacture of the particular explosive or chemical agent. At present there are in this country virtually no plants for the production of military explosives on a wartime scale, and there

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is little likelihood of any such plants being built until after a war is declared."

Eighteen highly scientific papers reporting advances in engineering research and the application of chemical engineering to industry and public health were discussed at the meeting. Subjects were concerned with heat transfer, distillation, absorption, desorption and other diffusional processes.

Jones Re-Elected President

Webster N. Jones, dean of the school of engineering of Carnegie Institute of Technology, was re-elected president. Other officers re-elected to serve were:—

Vice-president, James G. Vail, of Philadelphia Quartz, Philadelphia; secretary and executive secretary, Stephen L. Tyler, N. Y. City; and treasurer, C. R. DeLong, N. Y. City.

The following directors were elected to serve for a term of 3 years each:—

George Granger Brown, of the University of Michigan, Ann Arbor, Mich.; Charles R. Downs, of Weiss & Downs, consultants, N. Y. City; A. B. Newman, of the College of the City of New York; and J. H. Perry, of Du Pont.

Britain Drafts Purvis

Arthur B. Purvis, president and managing director of Canadian Industries, Ltd., has been drafted by Great Britain for the "duration of the war" to supervise Britain's war purchasing in the U. S. under the direction of Controller-General Col. J. H. M. Greenly, C.B.E.

Mr. Purvis' assignment to this highly important post recalls the story how a few days after war was declared in 1914 this 24-year-old "career" man of chemicals was told by his chief Sir Harry McGowan (then head of the Nobel Dynamite Trust Co.) to go to America. His specific instructions were: "Go quickly; spend 3 weeks; buy all the acetone in the country and hurry back."

Mr. Purvis carried out his instructions. He bought all he could lay his hands on and all that could be made in available plants.

He was ready to start for home when he got a second order to buy powder. He bought his powder and then his health broke down—the result of overwork, and earlier experiences in the tropics. He finished his buying—to the tune of about $25 millions. It was the first munitions purchase by Britain in the U. S. in the Great War. Then he had to quit work for three years to regain his health. As soon as he recovered the British Ministry of Munitions sent him to Chile to arrange for the erection of a munitions factory there. He went in February, 1918, and did not return until January, 1919.

By the time he returned to New York, war industries such as the Nobel Trust had to find their way back to peacetime basis once again. In consequence, Mr. Purvis was asked to open a New York office for Nobel. He stayed there until 1924. By this time the great Nobel, Mond and other British chemical and explosive firms had linked themselves into Imperial Chemicals Ltd.; they had joined hands with the huge Du Pont enterprises in the U. S. Jointly these two great organizations had assumed control of the Canadian enterprise—Canadian Explosives, Ltd. It was to Canada to manage this enterprise that Arthur Purvis was sent just 15 years ago.

Now he is back in the U. S. and before World War II is over he may be the biggest spending "P.A." in this country—possibly 2 or 3 billion dollars' worth.

Salesmen's Party—Dec. 28

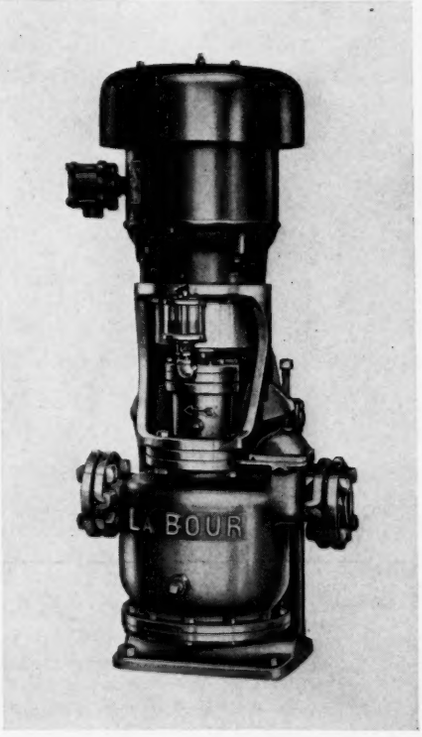
The Salesmen's Association of the American Chemical Industry will have its annual Christmas Party on Dec. 28, in the Grand Ball Room of the Hotel Edison, N. Y. City. Several surprises are being planned for the Party by the Association's entertainment committee, headed by Philip ("Phil") LoBue, Jos. Turner & Co., Ridgefield, N. J. Reservations, at $6 per person, should be sent to Mr. LoBue at the above address. Members and their guests are all invited to the Party, which is slated to begin at 5 P. M.

SOCMA To Meet Dec. 7

The Synthetic Organic Chemical Manufacturers Association will hold its annual meeting Dec. 7 in the Chemists' Club, N. Y. City. Business session, with various reports and the election of officers, will be opened at 5:00 P. M.

Annual dinner is scheduled for 6:30 P. M. and will be preceded by a sociability hour. Dr. Walter S. Landis, vice-president of American Cyanamid, will speak after the dinner.

A Correction



The above photograph should have appeared on page 571 of the November issue with the description of the revolutionary, new pump introduced by The LaBour Company, Inc., Elkhart, Ind. We regret that the wrong photograph was shown. The new LaBour Pump (Type R Pump) will be shown at Booth 32 at the Chemical Exposition and is fully described in the Company's Bulletin 48.

Penn. Salt Plans Expansion

After nearly three-quarters of a century on its present site in Philadelphia, Pennsylvania Salt Mfg. Co. is moving its Philadelphia plant to a new location more suitable for an expansion program planned for some time, according to a statement made Nov. 10 by Leonard T. Beale, Pennsalt's president.

PRESIDENT LEONARD T. BEALE

Penn. Salt to move Philadelphia plant after 75 years.

In making this statement, he said: "The sale recently made of its 62-acre waterfront property at Delaware & Oregon aves., said to be the largest real estate transaction in Philadelphia in 10 years, is the company's first step in its plans to relocate its plant operations to provide more suitable manufacturing facilities. For some time we have felt that our Philadelphia property at Delaware and Oregon aves. was unsuitable for our expansion program. We have, therefore, decided to relocate our operations on a new site in the metropolitan area where more adequate space and facilities will enable us to produce new products now under development, in addition to continuing the production of certain chemicals now being made at our Philadelphia plant."

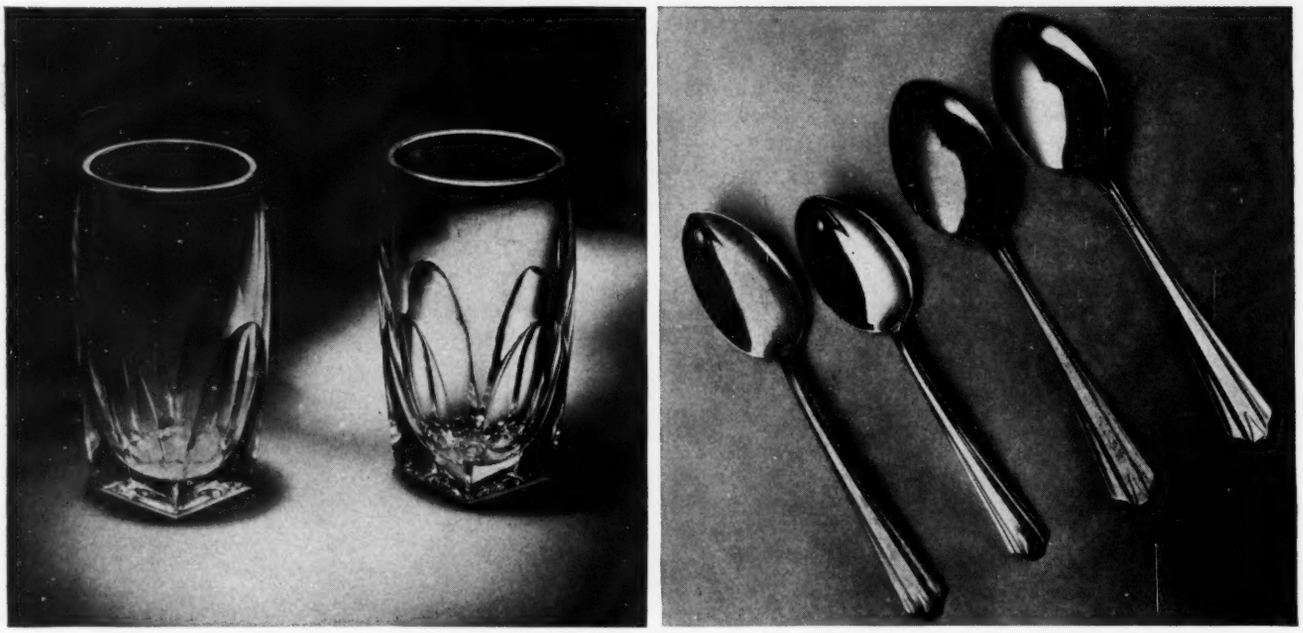
Mr. Beale made it clear that the new site for plant activities will be chosen in the Philadelphia area where the company can retain the many advantages that result from proximity to a large industrial center. Pennsalt has owned and operated its present property since 1867, and its headquarters have been established in Philadelphia since 1850. Company entertains no thought of moving its mid-city offices, in the Widener Building.

Read Adds Facilities

Read Machinery Co., York, Pa., has just broken ground for an addition to their present factory. The new building will house new and modern precision machine tool equipment.

BETTER RINSING AND CLEANSING

with DU PONT *Tetra Sodium Pyro Phosphate*



***The cloudy glass and silver** were soaked in ordinary hot cleaning solution, rinsed with clear water and allowed to drain and dry. This simulates the effect of repeated washings without wiping.*

***The clear glass and silver** were treated in the same manner except that a small amount of Du Pont "Pyro" was added to the cleaner in the solution.*

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Heavy Chemicals

Buyers Rush to Cover 1940 Requirements

Manufacturers Report Large Volume of Next Year's Business Already Signed Up—Shipments in November Continue at October Rate—Spot Stocks of Certain Items Scarce—

THE past few weeks saw little or no change in the heavy volume of shipments of industrial chemicals that has characterized the market now since August. Manufacturers are still hard-pressed to make immediate deliveries on certain items and have had to turn down tonnages on many others in order to take care of the needs of regular customers. However, there was a distinct decline in the feverish attempts to buy abnormal amounts. The generally reassuring news on prices for '40 helped considerably in restoring a greater degree of normalcy to transactions.

Manufacturers and buyers are now going through the annual contract period and for the first time in many years it is decidedly a seller's market. In view of general conditions, however, it is surprising how many important products are being offered under contract at quotations unchanged from '39 levels. Included in this group should be mentioned besides the alkalies and chlorine, bichromate, ammonia alum, anhydrous ammonia, barium chloride, precipitated barium carbonate, "carbon tet," sodium cyanide, sodium silicate, sulfur, etc. The principal changes made in the past three weeks were advances in sodium metasilicate and sodium sesquisilicate for 1940.

Imported ammonium silicofluoride was advanced by one importer last month to a basis of 12½c. There is very little material available and the market might well be described as nominal. A little red arsenic was offered at prices ranging from 19c-20c, a rise of 1c per lb. White arsenic was firm and unchanged in price. Stocks of the latter are ample.

Scarcity of Certain Items

There is quite a shortage of certain items. One of the most important is sal ammoniac and there is quite a heavy resale market in progress at prices much higher than domestic contract quotations. Some small lots of white were said to have brought as high as 12c. Potassium chlorate is another item that is extremely scarce and prices have risen sharply. Lack of imports in both of these items is the factor that is forcing the price structure up. Red prussiate of potash is still another item that is hard to pick up in the open market except at a heavy premium. Quite a wide spread has developed between the contract price and the spot price of potassium permanganate. Very little material is available. Imported sodium silicofluoride stocks are extremely low and it was reported that it was difficult to get the item even at 5½c. Domestic producers are pretty well sold up over the balance of the year. Spot stocks of bichromates are also hard to obtain.

All of the acids present a very strong appearance. Shipments of sulfuric are in exceptionally large volume. Acetic has worked into a much firmer position and there is considerable talk in the market of higher prices for '40.

The current contract season is expected to be one of the shortest on record. Alkali manufacturers report that most of the '40 tonnage has already been signed up. This situation seems to be general throughout the industry.

Important Price Changes

ADVANCED

	Nov. 22	Oct. 31
Ammonium silicofluoride, imp.	$0.12½	$0.09½
Arsenic, red	.19	.18
Barium chlorate	.20	.19
Chrome cake	16.00	15.00
Fluorspar imp.	26.50	25.00
Potassium chlorate	.20	.18
Sodium metasilicate, gran., c.l.	2.35	2.20
Sodium sesquisilicate, c.l.	2.90	2.80

DECLINED

Tin metal	$0.51	$0.55
Tin tetrachloride	.25	.27

Personnel

Dr. C. Lalor Burdick, Du Pont chemist and executive since 1928, has been appointed assistant to the president, Lammot du Pont, succeeding Henry B. du Pont who was recently made a vice-president and member of the executive committee. Dr. Burdick's appointment became effective on Nov. 22.

DR. C. LALOR BURDICK
Appointed Assistant to President Lammot du Pont

Born in Denver, Apr. 14, 1892, he graduated from Drake in 1911 and from M. I. T. in 1913. The following year, Dr. Burdick studied at the Kaiser Wilhelm Institute, Berlin, at the University of Basel, and at University College, London. In 1915, he received from Basel the Ph.D. degree in chemistry. Returning from Europe, he served briefly on the research staffs of both M. I. T. and Cal. 'Tech. In '17-'18, Dr. Burdick was a lieutenant in the Ordnance Dept., U. S. Army. Following the War, he became associated with Chile Copper Co. and Guggenheim Bros. as metallurgical engineer in South America, subsequently becoming vice-president and consulting engineer of Anglo-Chilean Nitrate Corp.

Since 1928, Dr. Burdick has been with the Du Pont Company, as assistant chemical director, Ammonia Dept., and as technical investigator, Development Dept. He is a member of the A. C. S., A. I. Ch. E., and A. I. M. M. E. In 1935, Dr. Burdick organized the Lalor Foundation for the support of purely scientific research. The Foundation, of which Dr. Burdick is secretary, is maintained by permanent endowments contributed by members of the Lalor family.

Marks To Resign

Dr. Lewis H. Marks, president of Continental Distilling (Philadelphia), and 9 affiliated companies in which he holds a similar position, will resign as head of these companies as of Dec. 31, 1939. He has held the presidency of the various companies since '33.

Sparks in New Position

Dr. William J. Sparks has been named chief of the Oil and Protein Division, Northern Regional Research Laboratory. He will be in charge of research on the properties and composition of corn and wheat oils and will direct investigations on the chemical modification of vegetable oils to improve and widen certain of their industrial uses.

Other Personnel Changes

Don L. Winchell has become a research engineer at Battelle Memorial Institute, Columbus, O. Graduate of Denison Univ. and previously with Republic Steel Corp. and Timken Steel and Tube Co., he will be engaged in research in process metallurgy.

Warden F. Wilson has resigned his position as Pittsburgh District manager of American Steel Foundries, to become general manager of sales for Lebanon Steel Foundry, Lebanon, Pa.

Limestone Products Corp. of America, Newton, N. J., has appointed Robert L. Quait director of research and sales, and John A. Zellhoefer sales manager.

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News of the Specialties

¶ Pennsylvania Salt Acquires Sterling Products — Supreme Court Refuses to Review Dennis Cube Patent Decision of Lower Court — Other News of the Specialty Companies —

Assets of Sterling Products Co., Easton, Pa., manufacturer of the well-known "Erusto Salts," "Erustocide," "Erusto-hue," "Erusto Blue," "Erusticator," and other laundry washroom and dry cleaning specialties, have been acquired by Penna. Salt Mfg. Co., Philadelphia. Production of these products will continue at Sterling's Easton plant.

In 1912, Howard B. Bishop, president of Sterling Products Co., discovered that certain properly buffered fluorine salts functioned satisfactorily as a neutralizing agent as well as a rust remover, with complete safety to fabric and fast colors. The benefits of this discovery were passed on to industry under the trade name of "Erusto Salts." During the past 27 years, by continued improvement of the original product, the Erusto organization has become nationally known in the laundry and dry cleaning trades.

Fred Prince, for many years vice-president and sales manager of Sterling Products, will head Pennsalt's newly organized Laundry & Dry Cleaning Division. J. Stanley Hall will be assistant manager of eastern territories and Gilbert H. Corbin, assistant manager of western territories.

Cube Patent Decision

The Supreme Court of the U. S. early last month refused to review a decision of the U. S. Circuit Court of Appeals for the 7th Circuit holding invalid the Dennis patent for the manufacture of a vermifuge and insecticide in powdered form from the root of cube plants found in South American countries. The circuit court had found the patent invalid because of prior use of the product and process in foreign countries as shown by published descriptions even though the foreign publications describing the use were not known in the U. S. at the time the application for the patent was filed.

In this action the American Cube Syndicate and the American Crop Protection Company charged infringement of the Dennis patent by Agicide Laboratories, Milwaukee, in the use of ground cube root as an insecticide. The claims of the patent are many, but the defense contended that there was no invention in them and that they did not in language cover their use of the ground root, but were limited, if basically valid, to cube root from which the fibrous matter had been extracted.

U. S. District Court in Milwaukee held sometime ago that the patent was valid; but this decision was reversed by the appellate court.

New Unit For Arsenates

Ansbacher Siegle Corp., N. Y. City, has let contracts for the installation of a modern continuous unit for the manufacture of lead and calcium arsenates. New unit will consist of a Bird Continuous Centrifugal Dewaterer and a Continuous Air Recirculating Proctor & Schwartz Dryer, the outlay being valued at about $35,000 in all.

Platt With Jordan

William J. Platt has been appointed as general manager of W. H. & F. Jordan Jr., Mfg. Co., 3047 Amber st., Philadelphia, Pa. Mr. Platt is well known in the textile trade. The chemist of the Jordan organization is Hillary Robinette, graduate of Temple University, and who was employed for six years in the organic research laboratories of Rohm & Haas Co., Inc. The company wishes to point out that, in the recent reorganization, only the technical, executive and sales departments were concerned whereas the plant personnel remains the same.

Robinson Joins Merck

Charles P. Robinson, formerly of Ciba Co., Inc., is now associated with Merck & Co., Inc., Rahway, N. J. He will handle textile specialties.

Stein, Hall Expansion

Stein, Hall & Co. is constructing a 5-story and basement addition to its factory in L. I. City, N. Y., which will provide about 27,000 sq. ft. of new production space to meet increased demand for the company's gums and dextrines, which are used by the paper box, envelope, textile and other industries. The addition will be completed in January. Construction work is being done by the W. J. Barney Corp., N. Y. City.

White Loses Election

Dr. Robert C. White, president, Robert C. White & Co., household specialty manufacturer, Philadelphia, running as the Democratic candidate for Mayor of Philadelphia, polled 97,945 votes as against 114,541 for the Republican candidate.

Trisco silk treatment is now being sold through department stores and specialty shops by Trisco products Inc., Philadelphia. It is a new hosiery washing treatment that is claimed to restore and protect the elasticity of silk hose. The treatment consists of a silk soap, silk finish, washer and drying forms.

With the adoption of a jar of modernistic style developed for the packaging of their "Tops-All" brand paste, The American Crayon Company, Sandusky, Ohio, has experienced a gratifying upward trend in sales. This item is sold throughout the country through chain stores and other retail outlets. With the adoption of the new container, The American Crayon Company also accepted Owens-Illinois' recommendation for a new and more colorful label. The total result is a real sales package that is giving promise of largely increased volume.

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USI SOLVENT NEWS USI

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December ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1939

Oiticica Oil Use Advances Sharply In Tung Shortage

Processing and Formulation Experience Spurs Consumption

Comparative newcomer in the family of drying oils, oiticica has had a spectacular rise in popularity in the last few years. American imports for the first eight months of 1939 were more than double the entire 1938 consumption, and it is anticipated that final figures for this year may reach 20,000,000 pounds.

Specifications Now Feasible

Uncertainty of tung oil supplies has been a big factor in the sharp rise in oiticica consumption since it was introduced to the American paint industry five years ago. Equally important, however, has been the accumulation of experience both in processing the oil and formulating it into paints. In the opinion of an executive of one of the leading oiticica producers, the data now available makes tentative specifications entirely feasible.

A wealth of information on oiticica use has been unearthed in the past few years. At first regarded simply as a substitute for tung, it is now recognized as having definite individual characteristics.

(*Continued on next page*)

Byrd Antarctic Expedition Will Use Anhydrous Solox

BOSTON, Mass.—U.S.I. Solox will be used to protect the automotive equipment to be used by the Antarctic Byrd Expedition against the dangers which arise from condensed moisture in tanks, supply fuel lines and strainers under the severe temperature conditions which exist in the Antarctic, it was announced here.

Anhydrous Solox being loaded on the North Star for use in fuel tanks of Byrd Expedition.

The freezing of such condensed moisture would present serious consequences, because the clearing of the fuel lines would be practically impossible since metal parts would be too cold to handle safely.

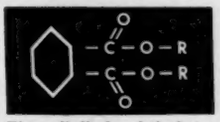
Anhydrous Solox, being soluble in gasoline in all proportions, can be uniformly interspersed throughout the entire mass of the gasoline, and since it is highly hygroscopic, it will be able to absorb the amount of condensed moisture that will probably be encountered. In this way it is possible to hold the moisture finely divided throughout the fuel mass instead of separating out.

Plasticizer Characteristics May Need Further Research Evaluation

Users of Plasticizing Materials Invited by U. S. Industrial Chemicals to Suggest Ideal Properties and Performance in Their Products

Prompted by the widespread interest in plasticizing agents, such as the dialkyl phthalates, U.S.I. plans a broader consideration of plasticizer properties and performance, in order to evaluate present materials and develop, if possible, new ones on a logical basis, as indicated by requirements of users.

Since their first introduction, there has been a consistent demand for all the phthalates as plasticizing agents in surface coatings, adhesives, chlorinated rubber, and plastics. Not only have dibutyl, diamyl, diethyl, and dimethyl phthalates quickly established themselves in a wide variety of industrial applications, but there has been evidence of growing interest in other phthalic acid esters.



The dialkyl phthalates are among the most popular plasticizers.

Users Seeking New Results

This keen interest in the phthalates is particularly noteworthy in view of the large number of other plasticizing agents on the market, including camphor, phosphates, citrates, tartrates, and ricinoleates. It is obvious, however, that many of the users of plasticizers are still searching for material that will give desired results in new processes or products. This is clearly shown by the continuing inquiries, apparently for applications where diamyl, dibutyl, diethyl, and dimethyl phthalates and other available plasticizers do not entirely meet the user's requirements.

It is the belief of U.S.I. that the present use of certain special plasticizers to meet individual requirements fails to answer the basic question. Such special plasticizers are usually adopted because it is felt that the change in the alkyl group will endow the phthalate with certain desirable characteristics. What are these characteristics? Why is it felt that an alkyl chain of more than five carbon atoms is superior to the alkyl groups now being used?

What Is Ideal Plasticizer?

What are the specifications for plasticizer properties and performance? Each user of plasticizers expects the addition of a plasticizer to accomplish certain definite results. What are those desired results? In other

(*Continued on next page*)

Industrial Alcohol Institute To Dissolve in January

According to a resolution unanimously adopted at a meeting of its Board of Directors, the Industrial Alcohol Institute will be dissolved on or before the 15th of next month. The Institute was organized February 20, 1926, and has cooperated since that date with scientific societies, trade organizations, and others concerned in protecting and promoting the uses of industrial alcohol—ethyl and denatured—under Federal and State laws.

In the resolution the Board praised particularly the services of Miss R. E. Boyce, Executive Secretary, and Captain James P. McGovern, General Counsel. Miss Boyce is finishing her twelfth year with the Institute. Captain McGovern, who has been active in the industry for thirty-nine years and General Counsel of the Institute since its organization, will continue the general practice of law in the Munsey Building, Washington, D. C.

A recent article by Dr. Harry L. Fisher, of the U. S. Industrial Alcohol Co., treats in detail the vulcanization of rubber, discussing the chemistry of the process and listing a number of non-sulphur vulcanizing agents, including some not previously described. Reprints of the article may be obtained free of charge from U.S.I. Ask for Bulletin VR.

Makes New Starch Paste For Paints and Lacquers

CHICAGO, Ill.—A new starch paste that is said to be suitable for use as a filler or thickener in paints, lacquers, and polishing compositions has been patented by an inventor here. The paste is reported to be water-free and water-resisting.

Lacquers, plastics, and paper coatings are a few of the industries making extensive use of plasticizers. Many of these users are searching for plasticizers with properties to meet the requirements of new products or processes.

ADVERTISEMENT—*This entire page is a paid advertisement.*

December ★ **SOLVENT NEWS** ★ 1939

"Dry-Ice" Keeps Glacial Ice Frozen in Shipment

LONGMIRE, Mt. Rainier National Park—Keeping 350 pounds of glacial ice frozen on a trip halfway across the country is something of a trick, and scientists here accomplished it by packing the ice in solid carbon dioxide ("Dry-Ice"*). Purpose of the unusual shipment is to study size of ice crystals at different depths in the glacier.

NEW YORK, N. Y.—Another novel use of "Dry-Ice"* is suggested in a patent granted to an inventor here, who claims that solid blocks of "Dry-Ice"* will extinguish gasoline, oil, or naphtha fires more efficiently than carbon dioxide gas or "snow."

*Manufactured and supplied by Pure Carbonic, Incorporated, an associated Company of U.S.I.

Improves Tire Fabrics With Dimethyl Phthalate

NEW YORK, N. Y.—A new fabric for tires and other rubber articles holds its weave shape exceptionally well, yet when subjected to vulcanizing temperatures the weft threads become inoperative, allowing the warp cords to lie straight, it is set forth in a patent issued to an inventor here. Weft of the fabric consists of organic esters or ethers of cellulose, containing from 5 to 30% of dimethyl phthalate or other solvents which display solvent action for the cellulose derivatives used at elevated temperatures, but not at normal temperatures.

Dimethyl phthalate is a product of U.S.I.

Plasticizer Characteristics

(*Continued from previous page*)

words, what is the user's conception of an ideal plasticizer? The answer to this question will, of course, be different depending on the use of plasticizers for different purposes. The manufacturers of plastics, adhesives, films, and protective coatings expect a plasticizer to perform certain duties. Are these duties best fulfilled by a mono-, di-, or tri-basic acid ester plasticizer? Is the variation of the alkyl group the answer?

U.S.I. believes that a fuller understanding of the answers to these questions is a necessary prerequisite to a logical study.

In order to accomplish this result, SOLVENT NEWS asks its readers to outline their requirements for plasticizing materials. What are the physical characteristics which are most desirable? What effect is expected by the addition of the plasticizer?

U.S.I. will welcome your comments and suggestions.

Thermometer Is Sealed Against Varnish Fumes

ROCHESTER, N. Y.—Fogging of glass and scales is avoided by any thermometer sealed against fumes and vapors, it is announced by a manufacturer here. Such a thermometer is useful in gum melting, oil boiling, and varnish cooking, the announcement continues, and eliminates the need for frequent cleaning of the tube and scale. It is also said that the thermometer uses a triple-lens tube with twice the accustomed angle of vision, and focuses three times as much light on the contrasting background.

Employs Ethyl Alcohol To Color Bronze Powders

NEW YORK, N. Y.—Bronze powders can be colored in a wide variety of lightfast shades by a new process involving an organic solvent such as ethyl alcohol, according to a patent issued to an inventor here.

The process consists in mixing aluminum bronze powders with tannic acid, alcohol, and a dye such as Brilliant Green or Auramine.

Ethyl Alcohol is produced by U.S.I.

Oiticica Consumption Rises

(*Continued from previous page*)

It is reported, for example, that products formulated with oiticica show slightly less resistance to water and alkalis than tung products, although the difference is less noticeable in pigmented products than in clear varnishes. Oiticica paints, on the other hand, show greater resistance to gases and less tendency to skin.

Inorganic Driers Unsuitable

Other studies have shown that inorganic salts should not be used as driers with oiticica, as they may cause violent foaming at high temperatures. Naphthenic driers or liquid linoleates are said to be suitable. Oiticica may require more driers than tung.

Experience seems to indicate that oiticica is best suited for the formulation of long oil varnishes with the best grade of synthetic resins. With 100% synthetic resins the bodying time of oiticica is less than with tung.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

An industrial odorant is said to overcome the objectionable odors of interior paint jobs. When added to paint, varnishes, and enamel mixes, it completely neutralizes the paint odors, and has no distinctive odor of its own, it is claimed. **(No. 280)**

U S I

A thermostatic filler automatically corrects liquid volume for changes in temperature, it is reported. It is said to facilitate uniform filling of containers under varying temperature conditions. **(No. 281)**

U S I

A new adhesive is said to be suitable for bonding plywood in the hot-press method, and for bonding thin veneers to wood, composition board, and some sheet metals. Adhesive is of the phenolic resin type, and is not affected by water or exposure to weather, the maker states. **(No. 282)**

U S I

A new faucet speeds up the handling of oils, paints, glues, and other viscous liquids, it is reported. It is said that shut-off is practically instantaneous and dripless. **(No. 283)**

U S I

Oil viscosity can be determined by new equipment, which permits making tests in accordance with ASTM Method D-88, it is claimed. Equipment is said to have a temperature range from 70 to 212 degrees F. **(No. 284)**

U S I

An aluminum paint can be applied to rusted chain link fence without removing the rust, the manufacturer claims. It is reported that the paint retains sufficient elasticity to prevent chipping when fence joints move. **(No. 285)**

U S I

A hammered finish can be applied on rough or porous metals, it is reported. Applications suggested by the maker include boiler jackets, water heaters, office equipment, and furniture. It is said to cover defects such as weld marks or file scratches. **(No. 286)**

U S I

An all-purpose cleaner is said to be free from abrasives, animal fats, and inert fillers. It is claimed that repeated applications of the cleaner will not injure any fabric or surface not affected by plain water. **(No. 287)**

U S I

A silver-like coating is said to resist vapors and fumes of strong corrosive agents. It is also said to be resistant to heat and proof against oil and water. Material is said to be a chromium treated aluminum paste. **(No. 288)**

U S I

A porcelain-like finish can be obtained with a paint that sets in about 15 minutes and dries hard in about an hour, it is claimed. Finish is said to be highly resistant to heat, water, acids, alkalis, and alcohol. **(No. 289)**

U.S.I. INDUSTRIAL CHEMICALS, INC.

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Diethyl Phthalate
Dimethyl Phthalate

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INTERMEDIATES
Acetoacetanilid
Acetoacet-o-chloranilid
Acetoacet-o-toluidid
Ethyl Acetoacetate
Sodium Ethyl Oxalacetate

ETHERS
Ethyl Ether
Ethyl Ether Absolute—A.C.S.

OTHER PRODUCTS
Acetone, C.P.
Butyl-mesityl-oxide-oxalate
Cellulose Acetate
Collodions
*Curbay Binders
*Curbay X (Dried Curbay)
*Derex
Ethylene
Methyl Acetone
Nitrocellulose Solutions
Potash, Agricultural
*Vacatone

Solvents

Spot Stocks of Many Solvents Scarce

Firm Prices Reported, With Wide Spread in Certain Items Between Contract and Spot Prices—Export Demand Still Heavy—Coatings Makers Curtail Operations Slightly—

PRICE stability was again the outstanding characteristic of the market for solvents in the past 30 days. Some of the feverish excitement and wild attempts at buying abnormally large quantities for inventory or speculative purposes were missing, but producers report that they are experiencing difficulties in keeping up with current demands for delivery of many of the more important items. There remains a very heavy demand for export. Manufacturers are in many instances actually turning down highly profitable business for foreign delivery in order to maintain a steady stream of material going into domestic channels.

Most of the solvents in the petroleum group were in excellent demand. Early in the past month advances of 1c each were made in No. 1 and No. 2 high solvency naphthas. Later increases of ¼c each per gal. were announced for No. 8, No. 30, and No. 40. On the new basis No. 1 and No. 2 were being offered at 16c and 17c respectively, f.o.b. Bayway, N. J., while No. 8 was offered at 13½c, No. 30 at 14½c, and No. 40 at 15c, all f.o.b Paulsboro, N. J.

Some let-down late in the month in deliveries of petroleum thinners going to the paint field was reported. A similar situation prevailed in the lacquer diluent. Certain of the coatings producers have had to curtail production because of the long-drawn out labor trouble at the Chrysler plants in Detroit. An excellent demand for cleaners' naphtha is reported in most sections of the country. Rubber manufacturers were said to be still operating on heavy schedules and demand for rubber solvent showed no signs of diminishing.

Speculate on '40 Prices

The movement of such important lacquer materials as acetone, butyl alcohol, butyl acetate, amyl acetate, ethyl acetate, etc., continues heavy and no let-down was apparent in the volume of export inquiries. Spot prices and resale prices are considerably higher on many materials. Contract quotations on many solvents are expected early in December, and consumers are anxiously waiting to see whether the current wide spread between contract and spot prices will mean higher levels for '40.

Methanol prices for the first 3 months of '40 will duplicate existing quotations. Producers report that much of the contract tonnage has already been signed up. Monthly statistics on production of crude and synthetic methanol, representing almost the entire output of these commodities in the U. S., have been released by Director William L. Austin, Bureau of Census.

Important Price Changes

	Nov. 21	Oct. 31
ADVANCED		
Petroleum, naphtha, high-solvency		
No. 1	$0.16	$0.15
No. 2	.17	.16
No. 8	.13½	.13
No. 30	.14½	.14
No. 40	.15	.14½
DECLINED		
None		

PRODUCTION

	Gallons			
	1939		1938	
	*Synthetic	Crude	*Synthetic	Crude
Jan.	2,462,884	315,814	2,896,894	458,347
Feb.	2,267,339	336,117	2,299,609	408,930
Mar.	2,406,564	364,500	2,343,828	432,800
April	2,276,385	389,423	1,975,999	314,664
May	1,778,581	354,415	1,860,400	330,875
June	2,295,288	343,992	1,629,570	293,091
July	2,495,394	377,755	1,449,607	309,219
Aug.	2,678,983	359,594	1,897,847	281,988
Sept.	2,639,934	404,876	1,929,655	303,225
Total	21,301,352	3,282,526	18,274,409	3,133,139

* The refined equivalent would be approximately 82% of the crude production.

Revamps Laboratory Set-Up

C. H. Dresser, director in charge of industrial sales for Anderson-Prichard Oil, announces a new Research and Development Department under the direction of B. I. Scoggin, formerly in charge of their Col-Tex Refining Company laboratory and of late acting as Asphalt Technician in the Oklahoma City office. All laboratories will be consolidated under this department but will continue to function as individual units.

A new laboratory is being constructed at Cyril, Okla., for process and basic research and part of the work, as well as personnel, will be transferred from the Chicago Laboratory to Cyril as soon as construction work on the new building is completed.

The Chicago Laboratory at 3921 North Ravenswood ave. will continue on industrial sales research, cooperating directly with industry. The Test Piece Service laboratory for the Dry Cleaning Industry at 31 North Summit st., Akron, Ohio, and the Soil Testing Laboratory of the Emulsified Asphalt Division at San Antonio, Texas, will continue their functions as in the past.

It is felt that this new department will furnish the link heretofore missing, between future refining procedure and consumer requirements.

McGovern Urges Action

In a letter to Stewart Berkshire, Deputy Commissioner of Internal Revenue, in charge of the alcohol tax unit, James P. McGovern, general counsel of the Industrial Alcohol Institute, asks that, in the contemplated revision of regulations on alcohol, the distinct character of this substance as a chemical material be adequately regarded.

Revenue officials are considering new regulations affecting distilled spirits other than alcohol. They contemplate also revision of regulations No. 3 which have to do with production, sale, and use of pure and denatured alcohols for industrial purposes. Pointing out the promotive purpose of the industrial statute, Mr. McGovern asks that due consideration be given to the construction of regulations on production, withdrawal, warehousing, selling, and bottling in order to avoid any complication which might interfere with the promotion of industrial alcohol in accordance with the statutory mandate.

In a communication to the institute Mr. McGovern suggests the desirability that scientific societies, trade organizations, and others concerned solely with the industrial use of alcohol arrange to present their views on the regulation proposals to the Alcohol Tax Unit.

Offers Technology Division

A refinery technology division to aid refiners in meeting the problems arising from advances in petroleum chemistry and automotive engineering has been established by Ethyl Gasoline Corporation. New division will be located in Detroit and will be headed by William H. Hubner, formerly connected with Universal Oil Products.

Penna. Refinery Expands

Pennsylvania Refinery Co., Titusville, Pa., is building a plant for the manufacture of waxes from petroleum, as an addition to its present refinery. New unit consists of 3 buildings, providing practically every facility for the complete refining of petroleum by-products.

Columbia Chemical Students

A plan to organize approximately 2,000 former students in the Dept. of Chemistry, Columbia University, into an alumni body to facilitate the exchange of chemical research between the Department and its graduates was announced last month by Prof. Harold C. Urey, head of the Department. He pointed out that many chemists eligible to become members of the Columbia Alumni Federation received undergraduate training elsewhere and are affiliated with the University only through the Department. Under the new plan they will be associated directly with the Department rather than the official alumni body.

Dr. Donald E. Price, National Oil Products Co., Harrison, N. J., permanent secretary of the Columbia Chemists' luncheon group of the A. C. S., is in charge of the new organization.

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PURE — Ascorbic Acid Merck meets and conforms to all tests for identity and purity of pure crystalline vitamin C.

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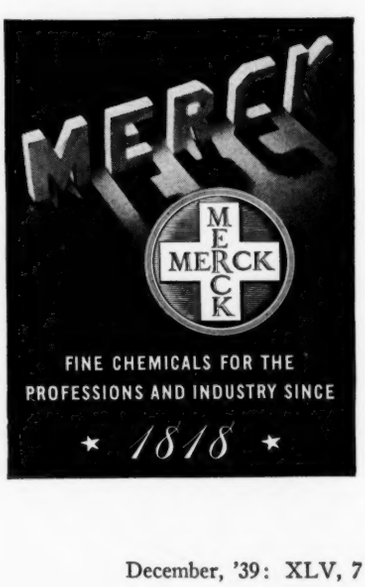
COUNCIL ACCEPTED AMERICAN MEDICAL ASSN Council on Pharmacy and Chemistry ACCEPTED — Ascorbic Acid Merck is accepted by the Council on Pharmacy and Chemistry of the American Medical Association.

There is undoubtedly an increasing demand on the part of the medical profession for vitamin C preparations of merit. Through the use of Ascorbic Acid Merck you can meet a substantial portion of this demand.

Our Chemical Service Department will welcome inquiries concerning the use of Ascorbic Acid Merck in your preparations. A brochure on the subject of vitamin C will be sent upon request.



MERCK & CO. INC. *Manufacturing Chemists* RAHWAY, N. J.

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Fine Chemicals

More Normal Trading in Fine Chemicals

Speculative Buying and Trading in Resale Lots Declines—Manufacturers Report Shipments Still Exceptionally Heavy—Mercury Prices Ease in Light Market—Quinine Advanced—

CONDITIONS in the fine chemical, pharmaceutical, aromatic chemical and essential oil markets showed very definite signs of returning to normal following two months of great excitement. Volume of business was only slightly under that transacted in October, but there were fewer attempts to acquire stocks either for inventory or speculative purposes. Buyers found, that with but very few exceptions, manufacturers were well able to supply normal quantities of every vital commodity and usually without advances in price, so the incentive to rush headlong into the resale market was unwise and unnecessary.

Important Price Changes

	Nov. 21	Oct. 31
ADVANCED		
Quinine alkaloid	$0.80	$0.76
sulfate USP X	.57	.54
USP XI	.64	.61
DECLINED		
Cocoa butter	$0.13	$0.14
Menthol (nat.)	3.25	3.35
Mercury	135.00	140.00

Mercury Drops Lower

Pricewise the market assumed a much quieter appearance. Mercury quotations sagged further and plenty of domestic and foreign metal was available at $135-$137 per flask. Demand in the last 3 weeks was but a small fraction of what it was previously.

Early in the past month higher quotations were posted on most of the quinine salts. The price of sulfate was advanced 3c. On the new basis U.S.P. X is 57c per oz., and XI is 64c. To these prices must be added the surcharge of 4c per oz. that covers war risk insurance, advance in freight rates, etc. All of the minor salts were included in the general advance.

Seasonal items, such as acetanilide and acetylsalicylic acid, etc., show definite increases in shipments. Quotations on acetylsalicylic acid are expected to hold unchanged into next year. Formaldehyde quotations have been extended unchanged into next year.

Firmness continues to characterize the markets for bismuth metal and its salts; also for cadmium and its derivatives. Extreme firmness was also noted in tartaric acid and all the tartars in fact. The basic material is strong and many consumers of tartar salts are of the opinion that higher prices are a distinct possibilty.

Distillers report an active market for all ethyl alcohol formulas. Pure is moving into industrial channels in large quantities with prices firm and unchanged after the rise placed in effect in October. A slightly easier situation was reported in C.P. glycerine. Buyers are not as active and stocks in the hands of producers is beginning to build up slightly. Export prices for C.P. were said to be almost twice that of the official domestic price schedule.

Statistics showing production, stocks, and imports of crude, refined and dynamite glycerine for the first 9 months of '39, together with a comparison with the corresponding period of '38 are given below:

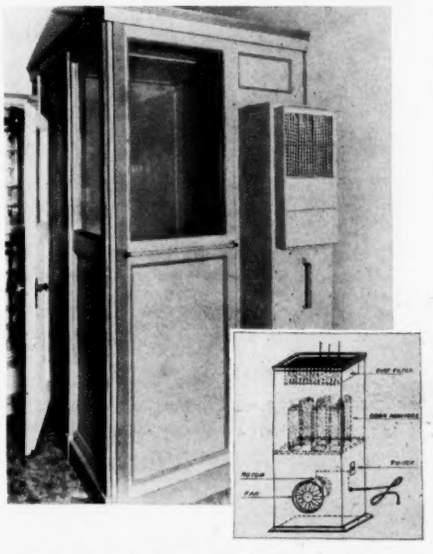
	Pounds 1939	Pounds 1938
Crude, 80% basis—		
Production	128,645,264	121,667,399
Stocks*	18,187,201	13,248,750
Imports	8,888,187	8,656,355
Refined—		
Production	67,038,914	68,742,469
Stocks†	45,965,490	44,279,806
Imports	318,878	2,386,300
Dynamite—		
Production	39,469,580	32,154,091
Stocks†	20,240,423	23,178,898

* Preliminary.
† Bureau of the Census.

Heavy Export Inquiries

There are large numbers of export inquiries about in the market. This condition is expected to expand over the coming months, stocks of fine chemicals, drugs, etc., in South America and other non-belligerent sections of the world are reaching record low points due to the fact that Germany is entirely cut off from export markets and even England and France find it difficult to continue to supply many such items to outsiders.

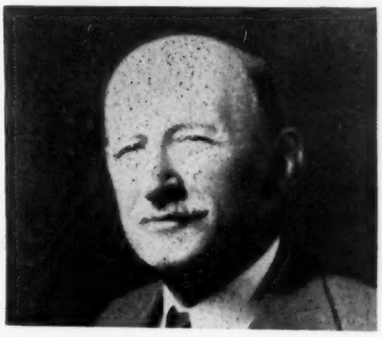
The heavy purchasing of essential oils and aromatics which characterized these markets during September and October was bound to be followed later by a reaction. A distinct let-down in demand was reported in the middle of last month. Consumers generally have acquired fairly large sized inventories. Quotations of several of the important essential oils showed signs of price unsettlement.



Chemists and perfumers in the laboratories of the Felton Chemical Co., no longer have to contend with the usual air odors of the aromatic chemical laboratory. As a part of their regular laboratory equipment, the company has installed an "odor-free" air chamber to which the chemist or perfumer may retire for the purpose of comparing aromatics, odor notes and bouquets without interference from or contamination by air-borne odors generated by activities going on in other parts of the laboratory. This small "odor-conditioned" section of the laboratory is an air-tight compartment, ventilated through a special odor-adsorber unit developed by the Dorex Air Conditioning Division of the W. B. Connor Engineering Corp., 114 East 32nd st., N. Y.

Obituaries

Edward G. Kohnstamm, 82, chairman of the board, H. Kohnstamm & Co., Inc.,



EDWARD G. KOHNSTAMM

N. Y. City, died Nov. 19 while on a visit to Los Angeles. Mr. Kohnstamm joined the firm in 1872 as an office boy. His father was one of the company's founders. Sixteen years later he was made a member of the board.

In 1922, he was elected president of the company, holding that office until January of this year. At that time he was made chairman of the board.

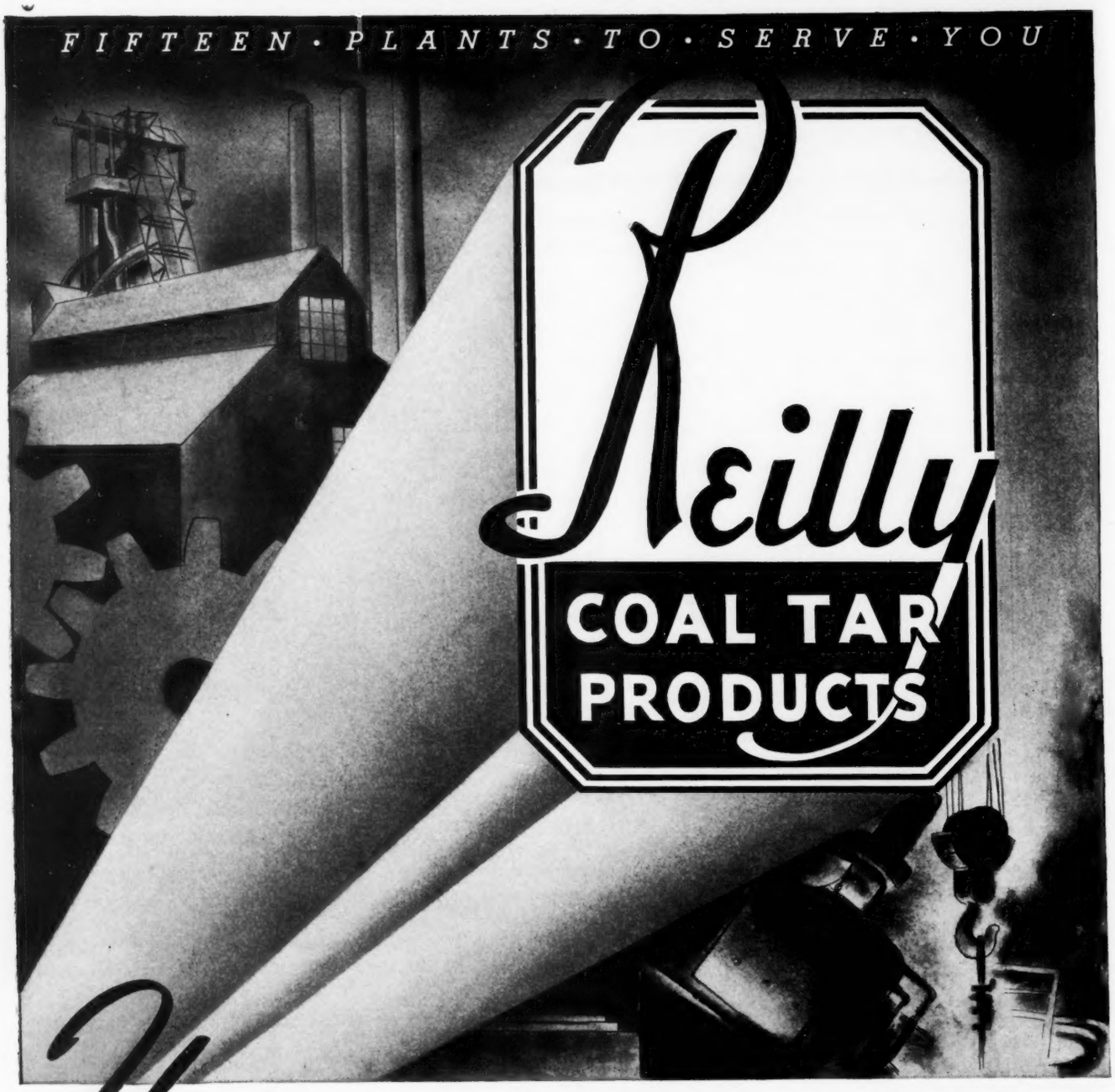
Mr. Kohnstamm was born in Jersey City, N. J. He is survived by his widow, Gloria, and a brother, Joseph.

Dr. Earle K. Strachan

Dr. Earle Kenneth Strachan, 53, professor of chemistry at Brown and nationally known authority on industrial and electrochemistry, died on Nov. 21 at his Providence (R. I.) home.

From 1916 to 1922 he was associated with the research department of National Aniline and Chemical Co. at Buffalo, N. Y., and went to Brown in 1922. Dr. Strachan was a member of the A. C. S., A. I. Ch. E., Electrochemical Society, Providence Engineering Society, Theta Chi, Sigma Xi, and Phi Lambda Upsilon.

In 1913, he married Lela Mildred Wright of Peoria, Ill. The couple had two sons, Richard Wright and Earle K. Strachan, Jr.



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Coal-Tar Chemicals

Phenol Rises Extended for First Quarter of '40

No Spot Stocks of Several Important Coal-Tar Chemicals Available—Cresol Nominal—September Coking Operations Show Sharp Gain—'40 Prices Expected Early in December—

EARLY in the past month one leading producer of phenol announced that the price for the first quarter of next year would remain unchanged from existing levels. This was the first contract price announcement of any importance and at this date (Nov. 21) consumers of coal-tar solvents, tar acids, intermediates, etc., were still completely in the dark as to what the price structure for '40 will be.

Producers of solvents, intermediates, etc., report that they are practically sold up over the final month of the year and that spot stocks are very difficult to find. This condition prevails despite the fact that coking operations continue to expand at a heavy rate. A particularly tight condition has developed in toluol. Makers have been forced to turn down quite a little business specially export tonnage.

The markets for both cresylic acid and naphthalene reflect the fact that it is extremely difficult if not entirely impossible to get through imported material. This condition is expected to correct itself very shortly at least to the extent that some materials from abroad will be available. The market for cresol is still very much a nominal one. Stocks do not begin to meet current demand. Firm conditions exist in creosote oil. Supplies of imported have been curtailed and the railroads and public utilities have been in the market recently for heavy purchases. Phenol shipments continue large with the plastics and resin producers demanding increasing amounts.

One important manufacturer in the third week of last month released quotations for the first quarter on benzoic, chlorosulfonic, salicylic and H acid at levels unchanged from '39. The following intermediates will hold at existing price levels for the first three months of '40: monochlorobenzene, orthochloraniline, orthochlorphenol, parachlorphenol and paranitrochlorobenzene.

Coking Operations Gain

September tar recovery amounted to approximately 47,839,442 gals., against 44,881,061 in August and 33,401,772 gals. in September, '38. For the first 9 months, output aggregated 357,634,459 gals., compared with 277,043,189 in the same period a year ago. Light oil production was estimated at 15,777,647 gals. during September, contrasted with 14,805,902 in the preceding month and 10,869,902 gals. in the like month a year ago. During the first 9 months output totaled 117,974,227 gals., as against 90,992,740 gals. in the corresponding period last year. September production of ammonia liquor (NH_3) content was 3,946,000 lbs., compared with 3,801,000 lbs. in August, a gain of 3.8%, and 3,439,000 lbs. in September 1938. Production for the first 9 months amounted to 33,671,000 lbs., against 28,749,000 lbs. in the like period a year ago.

Important Price Changes

	Nov. 22	Oct. 31
ADVANCED		
None		
DECLINED		
None		

Contract prices on most of the important coal-tar chemicals are not expected by the trade until early in December. Some advances are looked for, but buyers do not anticipate now any wholesale price advance movement.

September Exports Up Sharply

U. S. exports of coal-tar colors, dyes, stains, and color lakes advanced sharply to 1,024,000 lbs. (valued at $610,245) in September—more than double the amount shipped to foreign countries in the corresponding month of last year—according to the Chemical Division, Dept. of Commerce.

More than half the total, or 694,000 lbs., went to Canada in September. China was second with purchases aggregating 77,000 lbs. during the month, followed by Belgium with 31,000 lbs.; Brazil, 29,000 lbs.; British India, 28,000 lbs. Smaller shipments went forward to 40 other countries.

American coal-tar dyes are normally shipped in varying quantities to almost every foreign country and trading area of the world, where they compete with the products of other large producers, particularly Germany, which is believed to be the world's largest producer and exporter of such products. In '38, Germany exported a total of 61,000,000 lbs. of coal-tar dyes valued at about $44,000,000, official German statistics show.

Calco Safety Records

Certificates of meritorious accomplishment in accident prevention were presented to 35 employes of Calco Chemical Div., American Cyanamid Co., at a safety meeting held Nov. 9 in the company's plant at Bound Brook, N. J. The certificates indicated that each employe worked 3 years without a lost-time accident and admitted them as Class A members of the Calco Safety Organization. A membership button also was presented each of the men.

Agricultural Chemicals

Superphosphate Rises; Further Increases Likely

Domestic Potash Producers Withdraw From Export Markets—Greater Interest in Raw Materials Shown—No Spot Sulfate of Ammonia Available Until January 1—

DEFINITE signs of expansion of activity in the raw fertilizer markets were noted in the last few weeks. Mixers in the extreme South are beginning to show signs of greater activity for next season.

Highlight of the past month was the decision of the domestic potash producers to withdraw from the export markets. This will have a profound effect on the availability of this material for the next fertilizer season. There appear to be ample supplies of all fertilizer grades of potash with the exception of sulfate. No domestic producer is now making this, but I.A.C. is planning to have its plant ready sometime next year.

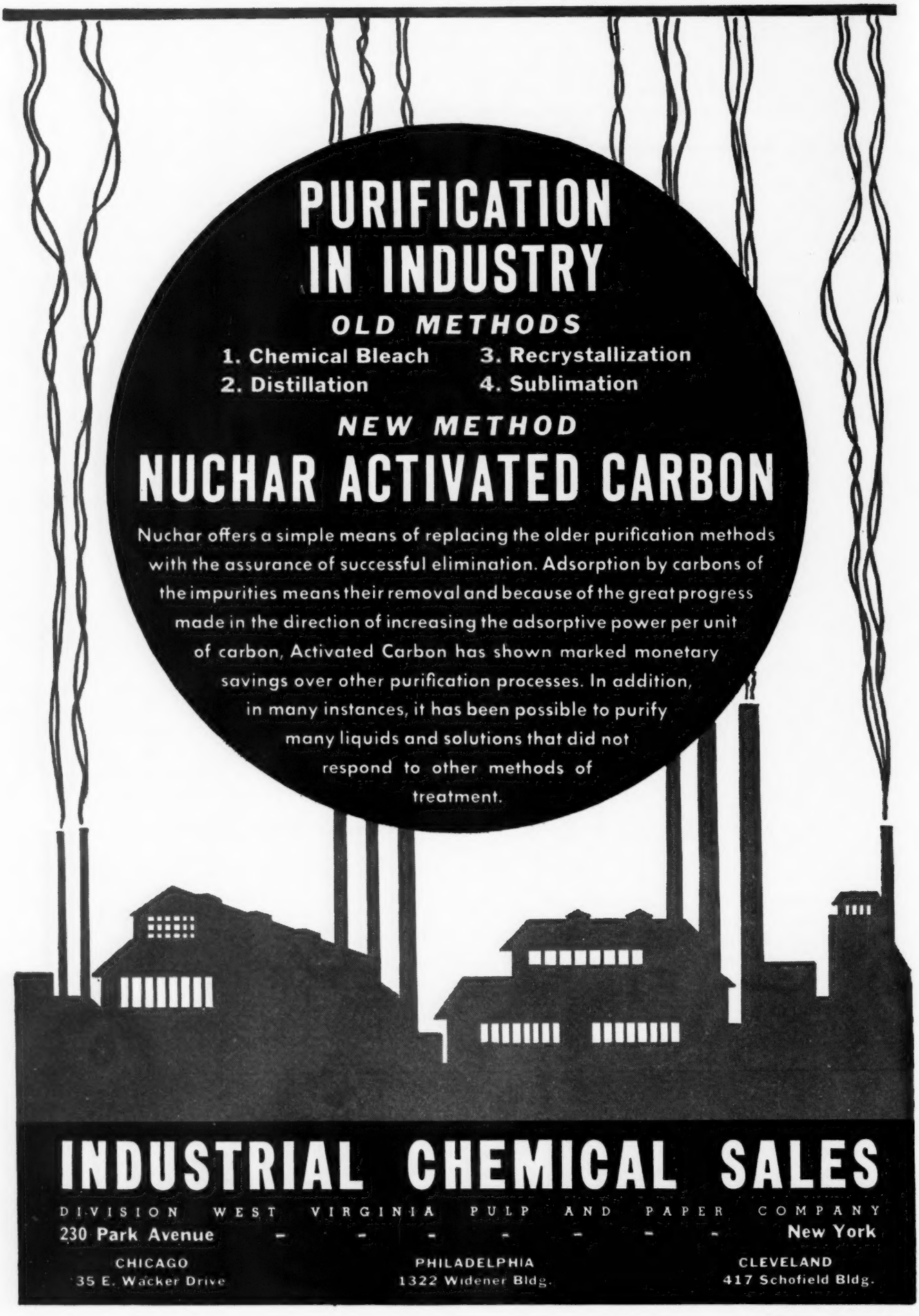
The December price of sulfate of ammonia advanced to $27.75 from the November figure of $27.50. These prices, however, are largely if not entirely nominal for spot material is not available until January when the price will be $28 per ton. Despite the rapid increase in coking operations over the past few months, the supply of sulfate has not reached the point where domestic and export requirements can be completely met.

Important Price Changes

	Nov. 21	Oct. 31
ADVANCED		
Bone meal, steamed, dom.	$30.00	$28.00
Bone meal, steamed, imp.	30.00	27.00
Bone raw, imp.	31.50	31.00
Superphosphate, 16%	9.00	8.00
run-of-pile	8.50	7.50
DECLINED		
Blood, dried, N. Y.	$3.50	$3.70

Superphosphate Higher

Superphosphate quotations were advanced on at least two occasions last month. Heavy demand for both domestic and export has reduced finished stocks to such a degree that in the Baltimore market the opinion was expressed that still further advances were practically a certainty.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Raw Materials

Oils and Fats Prices Shaded Slightly

Shortage of Myrobalans Sends Quotations Soaring—Quebracho Extract Advanced—Stocks of Chinawood Still Scarce—Carnauba Prices Strictly Nominal—Shellac Firm—

A SLIGHTLY easier tone was noticeable in the market for most of the natural raw materials in the past three weeks. Here and there, however, prices continued to score still further advances based on shortages. This was particularly true of myrobalans. Several separate price advances brought the price level of J1 to $50 and J2 to $41 per ton. Quebracho extract, solid and clarified, made another fractional gain. On the other hand, gambier was slightly easier, the common losing 1c to a basis of 7c, and Singapore cubes to a level of 10c for sizable quantities.

Demand for natural dyestuffs and tanstuffs was generally under the levels maintained during September and October. Some uneasiness is still caused by higher freight rates, war risk insurance and the uncertainty of shipments, but in the main suppliers and consumers alike look for a more orderly market.

Shading of quotations was reported in many of the important oils and fats last month and practically all members of this group showed net losses when price comparison was made with the levels in existence on Oct. 31. Little Chinawood appears to remain in the hands of resellers, hence transactions were few. Some spot sales were reported at 26c-27c. Some oil was also reported to have been sold at 24c for December and January arrival on the Pacific Coast.

Reflecting the quiet state of Chinawood most of the other drying oils were quiet and easier in price. Refined fish oils held at unchanged levels with demand light. Animal fats and oils lost ground pricewise in the last few weeks. The one highlight of the oils was the steady advance in castor. Stocks are said to be extremely scarce and the market at the moment is largely nominal. As a result of this rather unusual situation the market for sulfonated castor is at a standstill.

Critical Situation in Carnauba

The wax market continued in the last few weeks to be featured by the critical state of stocks of carnauba. On many grades quotations have been withdrawn. Importers report that futures are being offered in some instances, but only at prices that appear to be completely out of line and which they feel are not justified. Candelilla holds firm, and a similar situation prevails as regards Japan.

The shellac market has quieted down somewhat. There appeared to be less desire on the part of consumers to build inventories up further. The price structure held firm and additional strength is supplied by the fact that there remains the possibility that freight rates and war risk insurance rates may go still higher in the next few months.

Important Price Changes

	Nov. 21	Oct. 31
ADVANCED		
Myrobalans, J1	$50.00	$30.00
J2	41.00	23.00
Oil castor, blown	.13¼	.12¾
No. 3, tks.	.10½	.10
Menhaden, crude, tks.	.35	.33½
Quebracho extract, solid	.04½	.04⅜
Clarified	.04¾	.04⅝
Sumac, grd.	85.00	83.00
Wattle bark, E. African	36.50	36.00
DECLINED		
Gambier, common	$0.07	$0.08
cubes, Singapore	.10	.11
Oil Chinawood, drs.	.25	.28
coconut, crude, tks.	.03¾	.03⅞
corn, crude, tks.	.05⅝	.06½
lard, No. 1	.09¼	.09½
linseed, raw, tks.	.091	.093
neatsfoot, 20°	.19¼	.19¾
oiticica	.20	.21
oleo, No. 1	.09¼	.09¾
No. 2	.08¾	.09¼
olive, denat.	1.05	1.35
foots	.09	.10
peanut, crude, tks.	.06¾	.07
perilla, tks.	.132	.13½
sardine, crude, tks.	.32	.33
tallow, acidless, tks.	.08¾	.09¼
Sumac, leaf	85.00	90.00
Wax, bees, yellow, African	.29½	.30

Naval Stores Weaken

Both turpentine and rosin prices eased in the period under review. Movement into consuming channels slowed down considerably from the September-October level. Export inquiries continued in fairly heavy volume and lent support to the markets in the primary centers.

Record Output of Fats and Oils

Production of fats and oils from domestic materials in 1940 is likely to be the largest on record, the Bureau of Agricultural Economics indicated recently in a report on the outlook for fats, oils and oilseeds. Increased production of lard, soybean oil, linseed oil, and grease will much more than offset decreased production of cottonseed oil.

Stocks of fats and oils on July 1, 1939, were unusually large, the bureau stated. With record supplies of domestically-produced fats, import requirements for vegetable oils and oilseeds are considerably less this year than those of a year earlier. Despite large domestic supplies, domestic prices of edible fats and oils in '40 are expected to be somewhat higher than in '39, according to the report. Prices of practically all fats, oils, and oilseeds, with the exception of flaxseed and the paint oils, were the lowest in August, 1939, in more than 5 years. But with the outbreak of war in Europe in September, prices advanced fairly sharply. In late September and in October they dropped somewhat, but much of the advance was maintained.

Continued difficulties in securing shipments of tung oil from China because of military operations in that country will tend to support the demand for flaxseed and linseed oil in the U. S. But with larger world supplies and a somewhat weaker world demand, flaxseed prices in 1940 may average lower than in 1939 unless commodity prices generally score a sharp advance, the Bureau reported.

Bartlett, Dinner Speaker

Edwin R. Bartlett, Hooker Electrochemical, was the principal speaker recently at a dinner opening a campaign to raise $200,000 for the Niagara Falls Memorial Hospital.

New Construction

Virginia-Carolina Chem. Corp., Richmond, Va., is repairing the damage done to its Little Rock (Ark.) plant during a severe storm of several months ago. Cost of repairs will come to about $10,000.

Isco Chem. Division of Innis, Speiden & Co., N. Y. City, will build this winter a $5,000 factory yard office in the Isco plant grounds at Niagara Falls.

Form Niagara Brine Co.

A number of Niagara Falls chemical plants are said to be interested in the formation of the Niagara Brine Co., Inc., which is to establish and operate a salt mining plant at Linden, N. Y. The $1,500,000 project, to be undertaken in the near future, involves the establishment of a 200-acre artificial lake at Linden, N. Y., together with purifying and pumping stations, from which the brine will be piped to Niagara Falls. The brine would be sold to Falls chemical plants as raw material, principally for the production of chlorine and caustic soda.

Unique E B G Exhibit

Unique figures of pioneer characters, sculptured in metal by the late L. L. (Tony) Balcom, symbolic of the pioneering activities of the two affiliated companies, will draw many visitors to the Electro Bleaching Gas-Niagara Alkali exhibit (Booth 11) at the Chemical Exposition to be held at Grand Central Palace, N. Y. City, December 4th through 9th. Central figure is of a western plainsman with long rifle. Other figures are reproduced in photographs illuminated from behind to create a three-dimensional effect. Underneath these figures in a recessed section reaching across the back of the booth are EBG-Niagara products highlighted in museum jars—liquid chlorine, carbonate of potash, caustic soda, caustic potash and paradichlorobenzene.

Pigments and Fillers

Seasonal Slackening in Shipments Reported

November Raw Paint Material Sales Ahead 30-40%—Most Pigment Prices Repeated For First Quarter—China Clay Higher—Stocks of Casein Accumulating—Ester Higher—

WHILE there was the usual seasonal slackening in November shipments of raw paint materials, the total for the month was considerably ahead of the like period a year ago, in some instances as much as 40%. Most of the immediate interest centered, naturally, in the contract prices for '40.

Generally speaking, first quarter paint pigment prices will duplicate existing levels, despite the heavy demand that has prevailed now over the last few months. Early in the month contracts were offered by one large producer of titanium pigments on the same basis now in force for the 4th quarter. Slightly later it became known that current schedules on zinc oxide and lithopone would not be advanced during the first 3 months of next year.

No announcement on lead pigments was made through Nov. 21, but unless there is a radical change in the price of pig lead it is thought that white lead quotations will remain unaltered.

So far (Nov. 21) no announcement has been made by any of the carbon black factors concerning '40. Demand for the item has been exceptionally heavy and existing stocks have been radically reduced. Whether this will mean a higher price for the first quarter or half of next year is hard to say. Some buyers are of the opinion that quotations will advance, while others hold that competition is still too keen in carbon black to permit an increase even at this time.

Ester gum was offered on a contract basis for the first quarter of '40 at a price range of 6½c-6¾c for delivery in the Metropolitan N. Y. area. This generally represents an advance of ¼c over the price prevailing in that section during the present quarter.

Contracts for china clay were offered last month with prices generally about 50c per ton above existing price levels. Wet-ground mica was another item to be quoted higher, the increase amounting to ¼c. On the latest basis paint grade is 4¼c in carlots, with smaller quantities ¼c higher.

Much stronger markets for Blanc fixe were reported. Increases were made by several suppliers and ranged from $2.50 to $5 per ton for the dry, by-product material; $1.50 to $2.50 for the direct process grade and $2.50 for the pulp. Material was offered last week on the following basis:—dry, by-product in bags, $47.50 to $65 per ton for carlots and $55 to $70 for smaller lots; direct process, $57 to $75 per ton for carlots and $65 to $80 for smaller lots; and pulp, $32 to $45 per ton for carlots and $39.50 to $50 for smaller lots.

Important Price Changes

	Nov. 21	Oct. 31
ADVANCED		
Blanc fixe, dry, by-prod., bgs., c.l.	$47.50	$45.00
direct process, bgs., c.l.	57.00	55.50
pulp, c.l.	32.00	29.50
China Clay (contracts)	General 50c increase	
Ester gum (contracts)	.06½	.06¼
DECLINED		
Casein, 20-30 mesh	$0.18	$0.20
80-100 mesh	.18½	.20½
Red vermilion	2.46	2.70

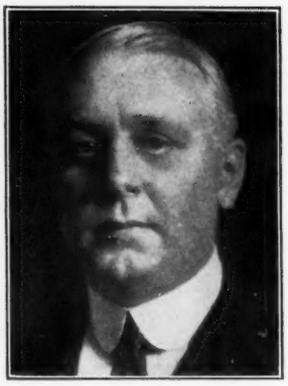
Announcements of contract prices on many of the dry colors are expected to be delayed. Many of the raw materials of their manufacture are imported items and producers of dry colors are expected to wait further in order to see just what the outlook over the first 6 months of '40 is likely to be.

Casein Prices Weaken

Casein prices declined last month. There has been a heavy influx of Argentine material and stocks in this country are now much greater than they have been in many months. On the whole the natural varnish gums are firm. Here and there last month quotations were lowered. Demand is still good, but the period of feverish buying for inventory seems over. This is generally true of nearly all raw paint materials. Where, however, buyers feel that there is the least possibility of a rise for '40 they are seeking to take in heavy shipments. This is, of course, not always possible for producers are mostly unwilling to ship quantities far in excess of what the customer's normal requirements are.

Third quarter sales of clear lacquers, pigmented lacquer bases and dopes, and thinners by 158 manufacturers, as reported to the Bureau of Census and a comparison with a similar period in 1938 were as follows:

		1939	1938
Clear lacquers	gals.	2,697,289	2,234,257
	value	$3,551,856	$2,978,714
Pigmented lacquers	gals.	2,410,528	1,964,971
	value	$5,364,252	$4,510,405
Lacquer bases and dopes	gals	622,200	407,592
	value	$688,680	$483,624
Lacquer thinners	gals	4,388,138	3,726,272
	value	$3,080,349	$2,669,406
Totals	gals	10,118,155	8,333,092
	value	$12,685,139	$10,642,149



ERNEST T. TRIGG

Re-elected president of the N. P. V. L. A.

To Expand Pigment Plant

The Du Pont Company has made public its plans for the early erection of a substantial addition to the titanium pigments plant at Edge Moor, about 3 miles north of Wilmington, on the Delaware River. The construction program, to be completed by early fall of next year, will provide additional capacity for producing titanium dioxide and extended titanium pigments which are sold under the trade names "Ti-Pure," "Ti-Cal," "Ti-Bar," "Ti-Sil," and "Ti-Tint."

The existing plant, comprising 26 buildings, was completed and put into operation in June, '35.

Although Du Pont is one of the oldest producers of pigments in the United States, its first pigment operation in Delaware was in 1929 when it acquired the Krebs Pigment & Chemical Co.'s plant at Newport, Del., which began business in 1902.

In 1931, the company again expanded its operations in the white pigment field, acquiring a large titanium dioxide plant in Baltimore. In addition, the company owns a pigments plant at Newark, N. J., where dry colors are made.

Operation of Du Pont's 4 white pigment and dry color plants is under the direction of the Krebs Pigments Department. Du Pont's combined plants, producing zinc sulfide pigments and titanium pigments, make that company one of the world's largest producers of these materials.

Pickett Talks on Tung Oil

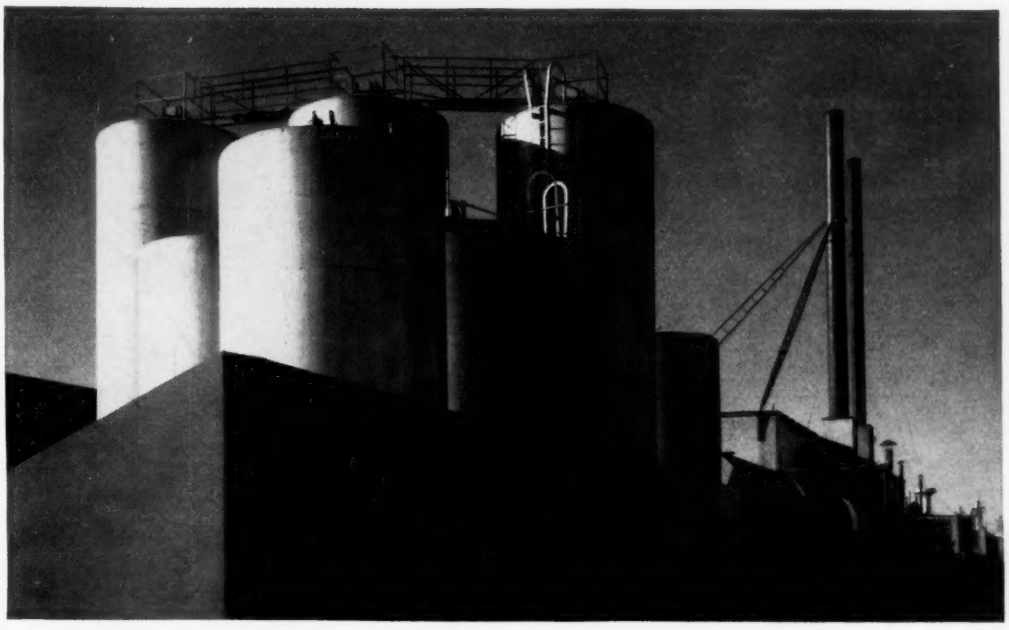
Dr. C. F. Pickett of the Coatings laboratory of The Resinous Products and Chem. Co., Philadelphia, addressed a meeting of the Louisville (Ky.) Paint and Production Club, held Nov. 16 in the Brown Hotel. His subject—"Tung Oil Conservation"—was a report based on several years' laboratory work with substitute oils.

Red Lead Specifications

The Treasury Department procurement division has approved an amendment to the federal specifications for red lead, dry and in oil, to become effective Jan. 15, 1940. Copies of the amended stipulation, TT-R-191a, may be procured from the Superintendent of Documents, Government Printing Office, Washington, at 5c each.

REICHHOLD

SYNTHETIC RESINS



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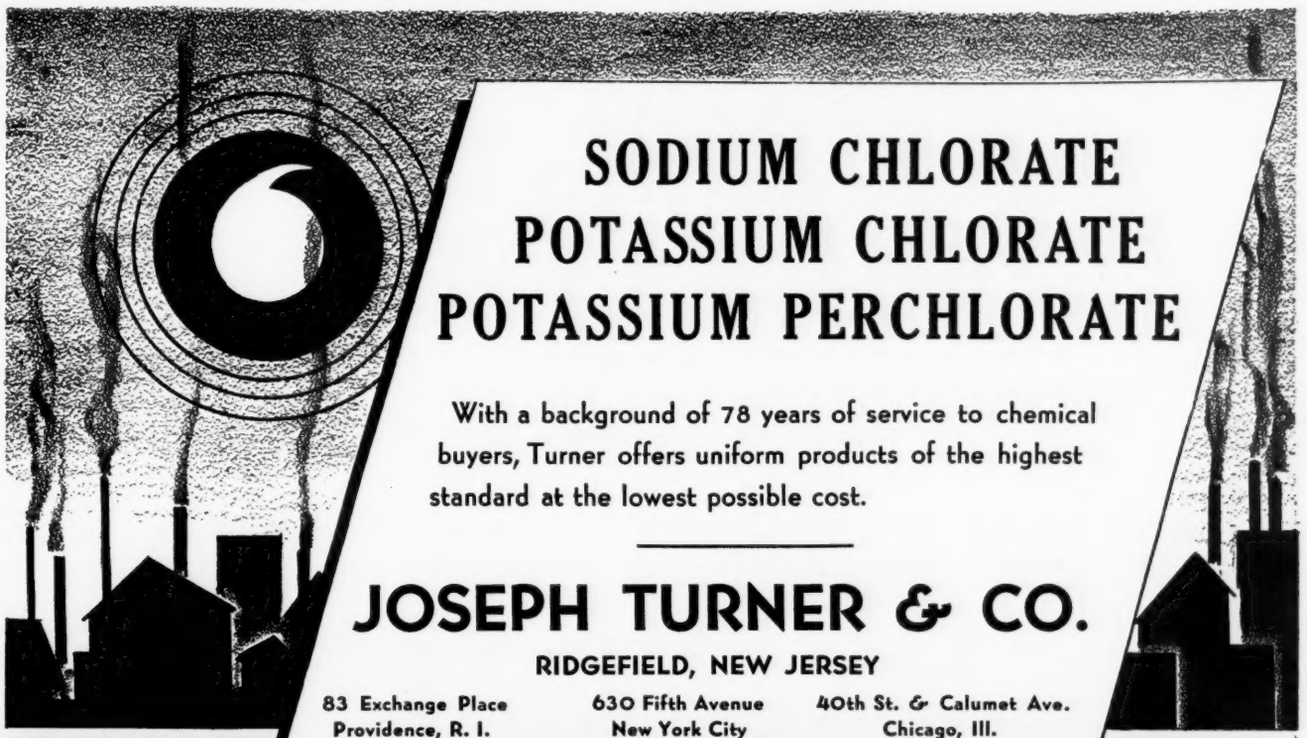

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Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1939 $1.25 - November 1939 $1.20

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Acetaldehyde, drs. c-l, wks	lb	...	.10	.10	.14	... .14
Acetaldol, 95%, 50 gal drs wks	lb.	.21	.25	.21	.25	.21 .25
Acetamide, tech, lcl, kgs	lb.	.28	.50	.28	.50	.32 .60
Acetanilid, tech, 150 lb bbls	lb.	...	.22	.22	.29	.29 .32
Acetic Anhydride, drs, f.o.b. wks, frt all'd	lb.	.10½	.11	.10½	.11	.10½ .11
Acetin, tech, drs.	lb.	...	.33	...	.33	... .33
Acetone, tks, f.o.b. wks, frt all'd	lb.	...	.06	.04¼	.06	... .04¼
drs, c-l, f.o.b. wks, frt all'd	lb.	...	.07	.05¼	.07	... .05¼
Acetyl chloride, 100 lb cbys	lb.	.55	.68	.55	.68	.55 .68
ACIDS						
Abietic, kgs, bbls	lb	.08¾	.09	.08¾	.09	.08¾ .10
Acetic, 28%, 400 lb bbls, c-l, wks	100 lbs	...	2.23	...	2.23	... 2.23
glacial, bbls, c-l, wks	100 lbs.	...	7.62	...	7.62	... 7.62
glacial, USP bbls, c-l, wks.	100 lbs.	...	10.25	...	10.25	... 10.25
Acetylsalicylic, USP, 225 lb bbls	lb.	...	.40	.40	.50	.50 .60
Adipic, kgs, bbls	lb.	...	.72	...	.72	... .72
Anthranilic, ref'd, bbls	lb.	1.15	1.20	1.15	1.20	1.15 1.20
tech bbls	lb.	...	.75	...	.75	... .75
Ascorbic, bot	oz.	2.75	3.00	2.75	3.25	... ...
Battery, cbys, wks	100 lbs.	1.60	2.55	1.60	2.55	1.60 2.55
Benzoic tech, 100 lb kgs	lb.	.43	.47	.43	.47	.43 .47
USP, 100 lb kgs	lb.	.54	.59	.54	.59	.54 .59
Boric, tech, gran, 80 tons, bgs, delv	ton *a*	...	96.00	...	96.00	95.00 96.00
Broenner's, bbls	lb.	...	1.11	...	1.11	... 1.11
Butyric, edible, c-l, wks, cbys	lb.	1.20	1.30	1.20	1.30	1.20 1.30
synthetic, c-l, drs, wks	lb.	...	.22	...	.22	... .22
wks, lcl	lb.	...	.23	...	.23	... .23
tks, wks	lb.	...	.21	...	.21	... .21
Camphoric, drs	lb.	5.50	5.70	5.50	5.70	5.50 5.70
Caproic, normal, drs.	lb.	...	.35	...	.35	... ...
Chicago, bbls	lb.	...	2.10	...	2.10	... 2.10
Chlorosulfonic, 1500 lb drs, wks	lb.	.03½	.05	.03½	.05	.03½ .05
Chromic, 99¾%, drs, delv	lb.	.15¼	.17¼	.15¼	.17¼	.15¼ .17¼
Citric, USP, crys, 230 lb bbls.	lb. *b*	.20	.21½	.20	.22½	.22 .25
anhyd, gran, bbls	lb. *b*	...	.23	.23	.25	.25½ .26½
Cleve's, 250 lb bbls	lb.	...	.57	...	.57	.50 .57
Cresylic, 99%, straw, HB, drs, wks, frt equal	gal.	.58	.60	.49	.64	.63 .91
99%, straw, LB, drs, wks, frt equal	gal.	.63	.70	.55	.71	.69 .94
resin grade, drs, wks, frt equal	lb.	.08¼	.09¼	.08¼	.09½	.09 .11¼
Crotonic, bbls, delv	lb.	.21	.50	.21	.50	.21 1.00
Formic, tech, 140 lb drs	lb.	.10½	.11½	.10½	.11½	.10½ .11½
Fumaric, bbls	lb.	...	.75	...	.75	.60 .75
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls	lb.	.70	.73	.70	.73	.70 .79
USP, bbls	lb.	.77	.81	.77	.81	.77 .91
Gamma, 225 lb bbls, wks	lb.	...	.85	...	.85	... .85
H, 225 lb bbls, wks	lb.	.50	.55	.50	.55	.50 .55
Hydriodic, USP, 47%	lb.	...	2.30	...	2.30	2.20 2.30
Hydrobromic, 34% conct 155 lb cbys, wks	lb.	.42	.44	.42	.44	.42 .44
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks	lb.	.80	1.30	.80	1.30	.80 1.30
Hydrofluoric, 30%, 400 lb bbls, wks	lb.	.06	.06½	.06	.07½	.07 .07½
Hydrofluosilicic, 35%, 400 bbls, wks	lb.	.09	.09½	.09	.09½	.09 .15
Lactic, 22%, dark, 500 lb bbls	lb.	.02½	.02¾	.02½	.02¾	.02½ .02¾
22%, light ref'd, bbls	lb.	.03½	.03¾	.03½	.03¾	.03½ .03¾
44%, light, 500 lb bbls	lb.	.05½	.05¾	.05½	.05¾	.05½ .05¾
44%, dark, 500 lb bbls	lb.	.06½	.06¾	.06½	.06¾	.06½ .06¾
50%, water white, 500 lb bbls	lb.	.10½	.11½	.10½	.11½	.10½ .11½
USP X, 85%, cbys	lb.	.42	.45	.42	.45	.42 .45
Lauric, drs.	lb.	11¾	.12¼	.11¾	.12¼	.08½ .12¼
Laurent's, 250 lb bbls	lb.	.45	.46	.45	.46	.45 .46
Levulinic, 5 lb bot wks	lb.	...	2.00	...	2.00	... 2.00
Linoleic, bbls	lb.	...	.20	...	.20	... .20
Maleic, powd, kgs	lb.	.30	.40	.30	.40	.30 .40
Malic, powd, kgs	lb.	.45	.60	.45	.60	.45 .60
Metanillic, 250 lb bbls	lb.	.60	.65	.60	.65	.60 .65
Mixed, tks, wks N unit		.06½	.07¼	.06½	.07¼	.06½ .07¼
S unit		.008	.009	.008	.009	.008 .009
Monochloracetic, tech, bbls	lb.	.16	.18	.16	.18	.16 .18
Monosulfonic, bbls	lb.	1.50	1.60	1.50	1.60	1.50 1.60
Muriatic, 18°, 120 lb cbys, c-l, wks 100 lb.		...	1.50	...	1.50	... 1.50
tks, wks 100 lb.		...	1.00	...	1.00	... 1.00
20°, cbys, c-l, wks 100 lb.		...	1.75	...	1.75	... 1.75
tks, wks 100 lb.		...	1.10	...	1.10	... 1.10
22°, c-l, cbys, wks 100 lb.		...	2.25	...	2.25	... 2.25
tks, wks 100 lb.		...	1.60	...	1.60	... 1.60
CP, cbys	lb.	.06½	.07½	.06½	.07½	.06½ .07½
N & W, 250 lb bbls	lb.	.85	.87	.85	.87	.85 .87
Naphthenic, 240-280 s.v., drs	lb.	.14	nom.	.10	.14	.10 .13
Naphthionic, tech, 250 lb bbls	lb.	.60	.65	.60	.65	.60 .65
Nitric, 36°, 135 lb cbys, c-l, wks 100 lb. *c*		...	5.00	...	5.00	... 5.00
38°, c-l, cbys, wks 100 lb. *c*		...	5.50	...	5.50	... 5.50
40°, cbys, c-l, wks 100 lb. *c*		...	6.00	...	6.00	... 6.00
42°, c-l, cbys, wks 100 lb. *c*		...	6.50	...	6.50	... 6.50
CP, cbys, delv	lb.	.11½	.12½	.11½	.12½	.11½ .12½
Oxalic, 300 lb bbls, wks, or N Y	lb.	.10¾	.12	.10¾	.12	.10¾ .12
Phosphoric, 85%, USP, cbys	lb.	.12	.14	.12	.14	.12 .14
50%, acid, c-l, drs, wks	lb.	.06	.08	.06	.08	.06 .08
75%, acid, c-l, drs, wks	lb.	...	.07½	...	.07½	.07½ .10½
Picramic, 300 lb bbls, wks	lb.	.65	.70	.65	.70	.65 .70
Picric, kgs, wks	lb.	.35	.40	.35	.40	.35 .40
Propionic, 98% wks, drs	lb.	...	.22	...	.22	... .22
80%	lb.	.16	.17½	.16	.17½	.16 .17½
Pyrogallic, tech, lump, pwd, bbls	lb.	...	1.05	...	1.05	... 1.05
cryst, USP	lb.	1.45	1.63	1.45	1.63	1.45 1.63
Ricinoleic, bbls	lb.	...	.35	...	.35	.35 .38
tech, bbls	lb.	...	.13	...	.13	... .13
Salicylic, tech, 125 lb bbls, wks	lb.	...	.33	...	.33	... .33
USP, bbls	lb.	.35	.40	.35	.40	.35 .45
Sebacic, tech, drs, wks	lb.	...	nom.	...	nom.	.37 .41
Succinic, bbls	lb.	...	.75	...	.75	... .75
Sulfanilic, 250 lb bbls, wks	lb.	.17	.18	.17	.18	.17 .18
Sulfuric, 60°, tks, wks	ton	...	13.00	...	13.00	... 13.00
c-l, cbys, wks 100 lb.		...	1.25	...	1.25	... 1.25
66°, tks, wks	ton	...	16.50	...	16.50	... 16.50
c-l, cbys, wks 100 lb.		...	1.50	...	1.50	... 1.50
CP, cbys, wks	lb.	.06½	.07½	.06½	.07½	.06½ .07½
Fuming (Oleum) 20% tks, wks	ton	...	18.50	...	18.50	... 18.50
Tannic, tech, 300 lb bbls	lb.	.40	.47	.40	.47	.40 .47
Tartaric, USP, gran, powd, 300 lb bbls	lb.	.31¼	.31¾	.27¼	.31¾	.24¼ .27¾
Tobias, 250 lb bbls	lb.	.55	.60	.55	.67	.65 .67
Trichloroacetic bottles	lb.	2.00	2.50	2.00	2.50	2.00 2.50
kgs	lb.	...	1.75	...	1.75	... 1.75
Tungstic, tech, bbls	lb.	...	...	1.70	1.80	1.65 2.00
Vanadic, drs, wks	lb.	...	...	1.10	1.20	1.10 1.20
Albumen, light flake, 225 lb. bbls	lb.	.55	.68	.52	.68	.52 .60
dark, bbls	lb.	.13	.18	.13	.18	.11 .18
egg, edible	lb.	.64	.68	.58	.78	.77 1.15
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv	lb.	...	.101	...	.101	.101 .106
c-l, drs, delv	lb.	...	.111	...	.111	.111 .116
lcl, drs, delv	lb.	...	.121	...	.121	.121 .126
Amyl, secondary, tks, delv	lb.	...	.08½	...	.08½	... .08½
drs, c-l, delv E, cf Rockies	lb.	...	.09½	...	.09½	... .09½
Benzyl, cans	lb.	.68	1.00	.68	1.00	.68 1.00
Butyl, normal, tks, f.o.b. wks, frt all'd	lb. *d*	...	.08	.07	.08½	.08½ .09
c-l, drs, f.o.b. wks, frt all'd	lb. *d*	...	.09	.08	.09½	.09½ .10
Butyl, secondary, tks, delv	lb. *d*	...	.05½	.05½	.06	... .06
c-l, drs, delv	lb. *d*	...	.06½	.06½	.07	... .07
Capryl, drs, tech, wks	lb.	...	.85	...	.85	... .85
Cinnamic, bottles	lb.	2.00	2.50	2.00	2.50	2.00 2.50
Denatured, CD, 14, c-l, drs, wks	gal. *e*	.31½	.36½	.27½	.36½	.31 .35
tks, East, wks	gal.	...	.25½	.21½	.25½	.23 .29
Western schedule, c-l, drs, wks	gal. *e*	...	.34½	.34½	.37	.36 .38
Denatured, SD, No. 1, tks,		...	.21½	.19½	.22	.22 .27
c-l, drs, wks	gal. *e*	...	.27½	.25½	.28	.28 .33

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

LOOKING AHEAD!

Resin manufacturing has become an exact science in which the laboratory and improved machinery both play an important part. The past year has seen many advancements in this dynamic art to meet new needs; and further developments are clearly indicated. Therefore, we consider it imperative to look ahead now to be properly equipped for what is to come.

To that end, two large, new, strategically-located and very modern plants, with ample room for expansion and adequate research facilities, for producing the S & W COMPLETE RESIN LINE, are now under careful construction. Soon they will provide an economical supplement to our present enlarged and improved factory, for the making of synthetics and the processing and refining of naturals. Through technical progress and efficient service, we hope to continue to merit the good will and confidence of the industry.

THE COMPLETE RESIN LINE

"S & W" ESTER GUM—*all types* • **"AROFENE"**—*pure phenolics*
"AROCHEM"—*modified types* • **"ARODURE"**—*urea-alkyds*
"AROPLAZ"—*alkyds* • **NATURAL RESINS**—*all standard grades*

STROOCK & WITTENBERG CORPORATION
LINCOLN BUILDING, NEW YORK, N. Y.

KOPPERS

PHENOL All standard grades such as 82% and 90% and 39° Melting Point Pure.

CRESOL U. S. P. with very close cut distillation range and light color, for pharmaceutical purposes—Meta-Para Cresol with high meta cresol content—Resin cresols close cut to wide boiling with guaranteed meta cresol contents and clean odor, free from sulfur compounds.

CRESYLIC ACID Many distillation ranges appropriate for all established uses—pale color—clean odor—total impurities besides water not exceeding one half of one per cent.

TAR ACID OILS Frozen crystal free at 0°C.—good emulsion-forming properties—low benzophenol content—appropriate for low to high coefficiencies with tar acid contents as required.

KOPPERS CHEMICALS AND SOLVENTS
Benzol (all grades) . . . Toluol (Industrial and Nitration . . . Xylol (10° and Industrial) . . . Solvent Naphtha (Including High Flash) . . . Naphthalene . . . Shingle Stain Oil . . . Refined Tars . . . Pitch Coke . . . Industrial Coal Tar Pitches . . . Flotation Oils . . . Creosote

OTHER KOPPERS PRODUCTS
Tanks and Tank Work . . . Removal and Recovery Apparatus . . . Coal Tar Roofing Materials . . . Waterproofing and Dampproofing Materials . . . Tarmac Road Tar Materials . . . Bituminous Base Paints . . . Coal . . . Coke . . . Fast's Self-aligning Couplings . . . Piston Rings . . . Pressure-treated Lumber

KOPPERS COMPANY. PITTSBURGH, PA.

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Alcohols (continued):						
Diacetone, pure, c-l, drs, delv	lb. *f*	...	.09	.09	.11½	... .11½
tech, contract, drs, c-l, delv	lb.	...	.08½	.08½	.10½	... .10½
Ethyl, 190 proof, molasses, tks	gal. *g*	...	4.48	4.46	4.48½	4.04 4.51½
c-l, drs	gal. *g*	...	4.54	4.49	4.54½	4.10 4.59½
c-l, bbls	gal. *g*	...	4.55	4.53	4.55½	4.11 4.58½
Furfuryl, tech, 500 lb drs	lb.	.25	.35	.25	.35	.25 .35
Hexyl, secondary tks, delv	lb.	...	.12	...	.12	... .12
c-l, drs, delv	lb.	...	.13	...	.13	... .13
Normal, drs, wks	lb.	3.25	3.50	3.25	3.50	3.25 3.50
Isoamyl, prim, cans, wks	lb.	...	.32	...	.32	... .32
drs, lcl, delv	lb.	...	.27	...	.27	... .27
Isobutyl, ref'd, lcl, drs	lb.	...	.073	.073	.09	.09 .10
c-l, drs	lb.	...	.068	.068	.08½	.08½ .09½
tks	lb.	...	.058	.058	.07½	.07½ .08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd	lb.	...	.36	...	.36	... .36
Ref'd 98%, drs, f.o.b. wks, frt all'd	gal.	...	.41	...	.41	... .41
Tech 91%, drs, above terms	gal.	...	.33½	...	.33½	... .33½
tks, same terms	gal.	...	.28½	...	.28½	... .28½
Tech 98%, drs, above terms	gal.	...	.37½	...	.37½	... .37½
tks, above terms	gal.	...	.32½	...	.32½	... .32½
Spec Solvent, tks, wks	gal.	...	.22½	.19	.23	.23 .28
Aldehyde ammonia, 100 gal drs	lb.	.80	.82	.80	.82	.80 .82
Aldehyde Bisulfite, bbls, delv	lb.	...	.17	...	.17	... .17
Aldol, 95%, 55 and 110 gal, drs, delv	lb.	.11	.12	.11	.20	... .20
Alphanaphthol, crude, 300 lb bbls	lb.	...	.52	...	.52	... .52
Alphanaphthylamine, 350 lb bbls	lb.	.32	.34	.32	.34	.32 .34
Alum, ammonia, lump, c-l, bbls, wks	100 lb.	3.40	3.65	3.40	3.65	3.40 3.65
delv NY, Phila	100 lb.	...	3.40	...	3.40	... 3.40
Granular, c-l, bbls wks	100 lb.	3.15	3.40	3.15	3.40	3.15 3.40
Powd, c-l, bbls, wks	100 lb.	...	3.55	...	3.55	... 3.55
Chrome, bbls	100 lb.	6.50	6.75	6.50	6.75	6.50 6.75
Potash, lump, c-l, bbls, wks	100 lb.	3.65	3.90	3.65	3.90	3.65 3.90
Granular, c-l, bbls, wks	100 lb.	3.40	3.65	3.40	3.65	3.40 3.65
Powd, c-l, bbls, wks	100 lb.	3.80	4.05	3.80	4.05	3.80 4.05
Soda, bbls, wks	100 lb.	...	3.25	...	3.25	... 3.25
Aluminum metal, c-l, NY	100 lb.	...	20.00	...	20.00	... 20.00
Acetate, 20%, bbls	lb.	.07½	.09	.07½	.09	.07½ .10
Basic powd, bbls, delv.	lb.	.40	.50	.40	.50	.40 .50
Chloride anhyd, 99%, wks	lb.	.08	.12	.06	.12	.07 .12
93%, wks	lb.	.05	.08	.05	.08	.05 .08
Crystals, c-l, drs, wks	lb.	.06	.06¼	.06	.06¼	.06 .06¼
Solution, drs, wks	lb.	.02¾	.03¼	.02¾	.03¼	.02¾ .03¼
Formate, 30% sol bbls, c-l, delv	lb.	...	.13	...	.13	... .13
Hydrate, 96%, light, 90 lb bbls, delv	lb.	.12½	.13½	.11½	.13	.12 .13
heavy, bbls, wks	lb.	.029	.03½	.029	.03½	.029 .03½
Oleate, drs	lb.	.16¾	.18½	.16¾	.18½	.16¾ .18½
Palmitate, bbls	lb.	...	.24½	.23	.24½	... .23
Resinate, pp., bbls	lb.	...	.15	...	.15	... .15
Stearate, 100 lb. bbls	lb.	.17½	.22½	.16	.22½	.19 .21
Sulfate, com, c-l, bgs, wks	100 lb.	...	1.15	...	1.15	1.15 1.35
c-l, bbls, wks	100 lb.	...	1.35	...	1.35	1.35 1.55
Sulfate, iron-free, c-l, bgs, wks,	100 lb.	...	1.45	...	1.45	... 1.30
c-l, bbls, wks	100 lb.	...	1.65	...	1.65	... 1.50
Aminoazobenzene, 110 lb kgs	lb.	...	1.15	...	1.15	... 1.15
Ammonia anhyd fert com, tks	lb.	.04½	.05½	.04½	.05½	.04½ .05½
Ammonia anhyd, 100 lb cyl	lb.	.16	.22	.16	.22	.16 .22
26°, 800 lb drs, delv	lb.	.02¼	.02½	.02¼	.02½	.02¼ .02½
Aqua 26°, tks, NH. cont.		...	.04z	...	.04z	... .05**
tk wagon	lb.	...	.02	...	.02	... .02
Ammonium Acetate, kgs	lb.	.26	.33	.26	.33	.26 .33
Bicarbonate, bbls, f.o.b. wks	100 lb.	...	5.56	5.15	5.71	5.15 5.71
Bifluoride, 300 lb bbls	lb.	.14½	.16½	.14½	.16½	.14½ .17
carbonate, tech, 500 lb bbls	lb.	.08	.12	.08	.12	.08 .12
Chloride, White, 100 lb bbls, wks	100 lb.	4.45	4.90	4.45	4.90	4.45 4.90
Gray, 250 lb bbls, wks	100 lb.	5.50	6.25	5.50	6.25	5.50 6.25
Lump, 500 lb cks spot	lb.	.10½	.11	.10½	11.	.10½ .11
Lactate, 500 lb bbls	lb.	.15	.16	.15	.16	.15 .16
Laurate, bbls	lb.	...	.23	...	.23	... .23
Linoleate, 80% anhyd, bbls	lb.	...	.15	...	.15	... .15
Naphthenate, bbls	lb.	...	.17	...	.17	... .17
Nitrate, tech, bbls	lb.	...	.0455	.036	.0455	.038 .0405
Oleate, drs	lb.	...	.15	...	.15	... .15
Oxalate, neut, cryst, powd, bbls	lb.	.19	.20	.19	.20	.19 .22½
Perchlorate, kgs	lb.	...	.16	...	.16	... .16
Persulfate, 112 lb kgs	lb.	.21	.24	.21	.24	.21 .24
Phosphate, dibasic tech, powd, 325 lb bbls	lb.	.07½	.10	.07½	.10	.07½ .10
Ricinoleate, bbls	lb.	...	.15	...	.15	... .15
Stearate, anhyd, bbls	lb.	...	.22	.22	.24	... .24
Paste, bbls	lb.	...	.06½	.06½	.08	... .07½

g Grain alcohol 25c a gal. higher in each case. **On a delv. basis.
z On a f.o.b. wks. basis.

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Ammonium (continued):						
Sulfate, dom, f.o.b., bulk	ton	... 27.50	27.00	28.00	27.00	28.50
Sulfocyanide, pure, kgs	lb.	... .55	...	.55	...	.55
Amyl Acetate (from pentane) tks, delv	lb.	... .095	.095	.10	.10	.11½
c-l, drs, delv	lb.	... .105	.105	.11	...	...
lcl, drs, delv	lb.	... .115	.115	.112	...	...
tech, drs, delv	lb.	... .12½	.10½	.12½	.11	.10½
Secondary, tks, delv.	lb.	... .08½	...	.08½	...	.08½
c-l, drs, delv	lb.	... .09½	...	.09½	...	.09½
tks, delv	lb.	... .08½	...	.08½	...	.08½
Chloride, norm, drs, wks	lb.	.56 .68	.56	.68	.56	.68
mixed, drs, wks	lb.	.0565 .0665	.0565	.077	.07	.077
tks, wks	lb.	... .0465	.0465	.06	...	.06
Mercaptan, drs, wks	lb.	... 1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs	lb.	... .25	...	.25	...	.25
Stearate, lcl, wks, drs	lb.	... .26	...	.26	...	.26
Amylene, drs, wks	lb	.102 .11	.102	.11	.102	.11
tks, wks	lb.	.. .09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks	lb.	.14½ .17½	.14½	.17½	.14½	.17½
Annatto fine	lb.	.34 .39	.34	.39	.34	.37
Anthracene, 80%	lb.	... .55	.55	.75	...	.75
Anthraquinone, sublimed, 125 lb bbls	lb.	... .65	...	.65	...	.65
Antimony metal slabs, ton lots	lb.	.14 nom.	.11¼	.14	.10¾	.14
Butter of, see Chloride.						
Chloride, soln, cbys	lb.	... .17	...	.17	...	.17
Needle, powd, bbls	lb.	.20 nom.	.12	.20	.12½	.16
Oxide, 500 lb bbls	lb.	.15¾ nom.	.10	.15¾	.11½	.16½
Salt, 63% to 65%, tins	lb.	.38 nom.	.25¾	.38	.26	.27
Archil, conc, 600 lb bbls	lb.	.21 .27	.21	.27	.21	.27
Double, 600 lb bbls	lb.	.18 .20	.18	.20	.18	.20
Aroclors, wks	lb.	.18 .30	.18	.30	.18	.30
Arrowroot, bbls	lb.	.08½ .09	.08½	.09	.08½	.09
Arsenic, Metal	lb.	... ...	.40	.60	.40	.44
Red, 224 lb cs kgs	lb.	.19 .20	.18	.19	...	.15¾
White, 112 lb kgs	lb.	.03 .03¼	.03	.03¾	.03	.04

B

Barium Carbonate precip, 200 lb bgs, wks	ton	52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs	ton	45.00	47.00	41.00	47.00	41.00	44.00
Chlorate, 112 lb kgs, NY	lb.	.20	.25	.16½	.25	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1	ton	77.00	92.00	77.00	92.00	77.00	92.00
Dioxide, 88%, 690 lb drs	lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls	lb.	.04½	.05	.04½	.05½	.04¾	.05½
Nitrate, bbls	lb.	.10½	nom.	.06¾	.10½	.06¾	.08¼
Barytes, floated, 350 lb bbls c-l, wks	ton	...	23.65	...	23.65	...	23.65
Bauxite, bulk, mines	ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks	ton	...	16.00	...	16.00	...	16.00
200 mesh	ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb. drs, wks	lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd	gal.	...	.16	...	.16	...	.16
90% c-l, drs	gal.	...	.21	...	.21	...	.21
Ind pure, tks, frt all'd	gal.	...	.16	...	.16	...	.16
Benzidine Base, dry, 250 lb bbls	lb.	.70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs	lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs	lb.	.30	.40	.30	.40	.30	.40
Tech, drs	lb.	.25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbls, wks	lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls	lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls	lb.	.51	.52	.51	.52	.51	.52
Bismuth metal	lb.	...	1.25	1.05	1.25	1.00	1.10
Chloride, boxes	lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes	lb	3.35	3.40	3.15	3.40	3.15	3.20
Oxychloride, boxes	lb.	...	3.10	2.95	3.10	...	2.95
Subbenzoate, boxes	lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs	lb.	1.73	1.76	1.43	1.76	1.13	1.58
Trioxide, powd, boxes	lb.	...	3.57	...	3.57	...	3.57
Subnitrate, fibre, drs	lb.	1.48	1.51	1.23	1.51	1.03	1.48
Blanc Fixe, 400 lb bbls, wks	ton *h*	47.50	80.00	40.00	80.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.		...	2.00	...	2.00	...	2.00
lcl, drs, wks	lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY	unit	...	3.50	2.50	4.25	2.50	3.25
Chicago, high grade	unit	...	3.80	2.30	4.25	2.35	3.35
Imported shipt	unit	...	3.35	2.65	3.90	2.90	3.45
Blues, Bronze Chinese Milori Prussian Soluble	lb.	.36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls	lb.	...	.11	...	.11	...	.11
Regular grade, group 1	lb.	...	.16	...	.16	...	.16
Special, group 1	lb.	...	.19	...	.19	...	.19
Pulp, No. 1	lb.	...	.27	...	.27	...	.27
Bone, 4½ + 50% raw, Chicago	ton	30.00	32.00	27.00	34.00	25.50	30.00
Bone Ash, 100 lb kgs	lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls	lb.	.06½	.08¼	.06½	.08¼	.06½	.08¼
Meal, 3% & 50%, imp	ton	27.00	nom.	22.00	27.00	20.50	23.75
Domestic, bgs, Chicago	ton	...	32.00	24.00	32.00	16.00	26.00
Borax, tech, gran, 80 ton lots, sacks, delv	ton *i*	...	43.00	...	43.00	42.00	43.00
bbls, delv	ton *i*	...	53.00	...	53.00	52.00	53.00

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case; *Freight is equalized in each case with nearest producing point.

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Church & Dwight Co., Inc.

Established 1846

70 PINE STREET NEW YORK

Bicarbonate of Soda
Sal Soda
Monohydrate of Soda
Standard Quality

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Borax (continued)					
Tech, powd, 80 ton lots, sacks ton *i*	...	47.00	...	47.00	... 47.00
bbls, del ton *i*	...	57.00	...	57.00	... 57.00
Bordeaux Mixture, drs lb.	.11	.11½	.11	.11½	.11 .11½
Bromine, cases lb.	.30	.43	.30	.43	.30 .43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.90½	.92½	.90½ .92½
Gold, blk lb.	.45	.65	.45	.65	.45 .65
Butanes, com 16-32° group 3 tks lb.	.02¼	.03¾	.02¼	.03¾	.02¼ .03¾
Butyl, Acetate, norm drs, frt allowed lb.	...	.08	.08	.09½	.09½ .10½
tks, frt allowed lb.	...	.07	.07	.08½	.08½ .09
Secondary, tks, frt allowed lb.	...	.05½	.05½	.06½	.06½ .07
drs, frt allowed lb.	.065	.07	.068	.08	.07½ .08½
Aldehyde, 50 gal drs, wks lb.	.15½	.17½	.15½	.17½	.16½ .17½
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60 .75
Crotonate, norm, 55 and 110 gal drs, delv lb.	...	.35	.35	.75	... ...
Lactate lb.	.22½	.23½	.22½	.23½	.22½ .23½
Oleate, drs, frt allowed lb.	...	.25	...	.25	... .25
Propionate, drs lb.	.16½	.17	.16½	.18½	.18 .18½
tks, delv lb.	...	.15½	.15½	.17	... .17
Stearate, 50 gal drs lb.		.26		.26	... .26
Tartrate, drs lb.	.55	.60	.55	.60	.55 .60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	... .35½
C					
Cadmium Metal lb.	.75	.80	.50	.85	.85 1.60
Sulfide, orange, boxes lb.	.75	.85	.75	.90	.80 1.60
Calcium, Acetate, 150 lb bgs c-l, delv 100 lb.	...	1.90	1.65	1.90	... 1.65
Arsenate, c-l, E. of Rockies, dealers, drs lb.	.06¾	.07¼	.06¾	.07¼	.06¾ .07¼
Carbide, drs lb.	.05	.06	.05	.06	.05 .06
Carbonate, tech, 100 lb bgs c-l lb.	...	1.00	...	1.00	... 1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv ton	...	22.00	...	22.00	22.00 23.50
paper bgs, c-l, delv ton	23.00	36.00	23.00	36.00	23.00 36.00
Solid, 650 lb drs, c-l, delv ton	...	20.00	...	20.00	20.00 21.50
Ferrocyanide, 350 lb bbls wks lb.	...	.17	...	.17	... .17
Gluconate, Pharm, 125 lb bbls lb.	.50	.57	.50	.57	.50 .57
Levulinate, less than 25 bbl lots, wks lb.	...	3.00	...	3.00	... 3.00
Nitrate, 100 lb bgs ton	...	28.00	...	28.00	... 28.00
Palmitate, bbls lb.	.22	.23	.22	.23	.22 .23
Phosphate, tribasic, tech, 450 lb bbls lb.	.06½	.07½	.06½	.07½	.06½ .07½
Resinate, precip, bbls lb.	.13	.14	.13	.14	.13 .14
Stearate, 100 lb bbls lb.	.19	.21	.19	.21	.19 .21
Camphor, slabs lb.	.65	.66	.46	.75	.52 .56
Powder lb.	.65	.66	.45	.75	.52 .56
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05 .05¾
Black, c-l, bgs, delv, price varying with zone† lb.	.02¾	.03¾	.02¼	.03¾	.027 .0380
lcl, bgs, f.o.b. whse lb.	...	.06¼	...	.06¼	.05¾ .06¼
cartons, f.o.b. whse lb.	...	.06¼	...	.06¼	... .06¼
cases, f.o.b. whse lb.	...	.07	...	.07	... .07
Decolorizing, drs, c-l lb.	.08	.15	.08	.15	.08 .15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06 .08
Tetrachloride, 55 or 110 gal drs, c-l, delv lb.	.05	.05½	.05	.05½	.05 .06
Casein, Standard, Dom, grd lb.	.18	.21	.07	.23	.06½ .13½
80-100 mesh, c-l, bgs lb.	.18	.21	.07½	.23½	.07 .14
Castor Pomace, 5½ NH_3, c-l, bgs, wks ton	...	17.50	.16.50	18.50	18.50 21.00
Imported, ship, bgs ton	...	20.00	18.00	20.00	20.00 21.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12 .15
Transparent, cs lb.	...	.20	...	.20	... .20
Cellulose, Acetate, 50 lb kgs lb.	...	.35	.35	.36	.36 .40
Chalk, dropped, 175 lb bbls lb.	.02¾	.03¾	.02¾	.03¾	.02¾ .03¾
Precip, heavy, 560 lb cks lb.	.02¾	.03¼	.02¼	.03¼	.02¼ .04
Light, 250 lb cks lb.	.03¼	.04	.03¼	.04	.03¼ .04
Charcoal, Hardwood, lump, blk, wks bu.	...	.15	...	.15	... .15
Softwood, bgs, delv* ton	25.00	36.00	23.00	36.00	23.00 34.00
Willow, powd, 100 lb bbls, wks lb.	.06	.07	.06	.07	.06 .07
Chestnut, clarified, tks, wks lb.	...	.01¾	...	.01¾	.01¾ .02125
25%, bbls, wks lb.	...	.02	...	.02	.02 .0225
Pwd, 60%, 100 lb bgs, wks lb.	...	.04½	...	.04½	.04½ .04¾
China Clay, c-l, blk mines ton	...	7.60	7.00	7.60	... 7.00
Imported, lump, blk ton	26.00	nom.	22.00	26.00	22.00 25.00
Chlorine, cyls, lcl, wks, contract lb.	.07½	.08½	.07½	.08½	.07½ .08½
cyls, c-l, contract lb. *j*	...	.05¾	.05¾	.05½	... .05½
Liq, tk, wks, contract 100 lb.	...	1.75	1.75	2.00	2.00 2.15
Multi, c-l, cyls, wks, cont lb.	...	1.90	1.90	2.15	2.30 2.55
Chloroacetophenone, tins, wks lb.	3.00	3.50	3.00	3.50	3.00 3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks lb.	.06	.07½	.06	.07½	.06 .07½
Chloroform, tech, 1000 lb drs lb.	.20	.21	.20	.21	.20 .21
USP, 25 lb tins lb.	.30	.31	.30	.31	.30 .31
Chloropicrin, comml cyls lb.	...	.80	...	.80	... .80
Chrome, Green, CP lb.	.21	.25	.21	.25	.21 .25
Yellow lb.	.14½	.15½	.14½	.15½	.14½ .15½

j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Chromium Acetate, 8% Chrome, bbls lb.	.05	.08	.05	.08	.05 .08
Fluoride, powd, 400 lb bbl lb.	.27	.28	.27	.28	.27 .28
Coal tar, bbls bbl.	7.50	8.00	7.50	8.00	7.50 8.00
Cobalt Acetate, bbls lb.	.65	.67	.65	.67	.65 .68
Carbonate tech, bbls lb.	1.25	1.60	1.25	1.63	... 1.63
Hydrate, bbls lb.	...	1.78	...	1.78	1.36 1.78
Linoleate, solid, bbls lb.	...	.33	...	.33	... .33
paste, 6%, drs lb.	...	.31		.31	... .31
Oxide, black, bgs lb.	...	1.84	1.67	1.84	... 1.67
Resinate, fused, bbls lb.	...	.13½	...	.13½	... .13½
Precipitated, bbls lb.	...	.34	...	.34	... .34
Cochineal, gray or bk bgs lb.	.35	.38	.35	.38	.35 .38
Teneriffe silver, bgs lb.	.36	.39	.36	.39	.36 .39
Copper, metal, electrol 100 lb.	...	12.50	10.00	12.50	9.00 11.25
Acetate, normal, bbls, wks lb.	.22	.24	.21	.24	.21 .23
Carbonate, 52-54% 400 lb. bbls lb.	.169	nom.	.14½	.169	.1340 .16¾
Chloride, 250 lb bbls lb.	.18	nom.	.12½	.18	.12½ .17
Cyanide, 100 lb drs lb.		.34	...	.34	.34 .38
Oleate, precip, bbls lb.		.20	...	.20	... .20
Oxide, black, bbls, wks lb.	.18¾	nom.	.15	.18¾	.13½ .17¾
red 100 lb bbls lb.	.20	nom.	.15¾	.20	.15 .19775
Sub-acetate verdigris, 400 lb bbls lb.	.18	.19	.18	.19	.18 .19
Sulfate, bbls, c-l, wks 100 lb.	...	4.75	4.10	4.75	4.00 4.50
Copperas, crys and sugar bulk c-l, wks ton	...	14.00	...	14.00	12.00 14.00
Corn Sugar, tanners, bbls 100 lb.	...	2.94	2.89	3.19	2.95 3.30
Corn Syrup, 42°, bbls 100 lb.	...	2.97	2.92	3.17	2.89 3.16
43°, bbls 100 lb.	...	3.02	2.97	3.22	2.94 3.21
Cotton, Soluble, wet, 100 lb bbls lb.	.40	.42	.40	.42	.40 .42
Cream Tartar, powd & gran 300 lb bbls lb.	.25¼	.25¾	.22¼	.25¾	.19¾ .23¼
Creosote, USP, 42 lb cbys lb.	.45	.47	.45	.47	.45 .47
Oil, Grade 1 tks gal.	.13½	.14	.13½	.14	.13½ .14
Grade 2 gal.	.122	.132	.122	.132	.122 .132
Cresol, USP, drs lb.	.09½	.10	.09½	.10½	.10 .12½
Crotonaldehyde, 97%, 55 and 110 gal drs, wks lb.	.11	.12	.11	.22*	.22* .30*
Cutch, Philippine, 100 lb bale lb.	...	.04	.04	.04½	.04 .06
Cyanamid, pulv, bags c-l, frt all'w'd, nitrogen basis, unit	...	1.27½	...	...	... ...
D					
Derris root 5% rotenone, bbls lb.	.24	.30	.24	.30	.34 .43
Dextrin, corn, 140 lb bgs f.o.b., Chicago 100 lb.	3.35	3.45	3.30	3.75	3.30 3.75
British Gum, bgs 100 lb.	3.60	3.70	3.55	3.95	3.55 4.00
Potato, Yellow, 220 lb bgs lb.	.07¾	.07¾	.07	.08¼	.07¼ .08¾
White, 220 lb bgs, lcl lb.	.08½	.09	.08	.09	.08 .09
Tapioca, 200 bgs, lcl lb.	...	.0715	...	.0715	.0715 .08
White, 140 lb bgs 100 lb.	3.30	3.50	3.25	3.70	3.30 3.70
Diamylamine, c-l, drs, wks lb.	...	.47	...	.47	.47 .75
l.c.l. drs, wks lb.	...	.50	...	...	... ...
tks, wks lb.	...	.45	...	...	... ...
Diamylene, drs, wks lb.	.095	.102	.095	.102	.095 .102
tks, wks lb.	...	.08½	...	.08½	... .08½
Diamylether, wks, drs lb.	.085	.092	.085	.092	.085 .092
tks, wks lb.	...	.075	...	.075	... .075
Oxalate, lcl, drs, wks lb.	...	.30	...	.30	... .30
Diamylphthalate, drs, wks lb.	.21	.21½	.19	.21	.19 .21
Diamyl Sulfide, drs, wks lb.	...	1.10	...	1.10	... 1.10
Diatomaceous Earth, see Kieselguhr.					
Dibutoxy Ethyl Phthalate, drs, wks lb.	...	.35	...	.35	... .35
Dibutylamine, lcl, drs, wks lb.	...	.53	.53	.55	... .55
c.l. drs, wks lb.	...	.50	...	...	... ...
tks, wks lb.	...	.48	...	...	... ...
Dibutyl Ether, drs, wks, lcl lb.	.24½	.25	.24½	.25	.25 .30
Dibutylphthalate, drs, wks, frt all'd lb.	.19	.19½	.19	.19½	.19 .21
Dibutyltartrate, 50 gal drs lb.	...	.50	.45	.54	.45 .54
Dichlorethylene, drs lb.	...	.25	...	.25	... .25
Dichloroethylether, 50 gal drs, wks lb.	.15	.16	.15	.16	.15 .16
tks, wks lb.	...	.14	...	.14	... .14
Dichloromethane, drs, wks lb.	...	.23	...	.23	... .23
Dichloropentanes, drs, wks lb.	no prices		no prices		... ...
tks, wks lb.	no prices		no prices		... ...
Diethanolamine, tks, wks lb.	...	.23	...	.23	... .23
Diethylamine, 400 lb drs, lcl, f.o.b., wks lb.	...	.70	.70	3.00	2.75 3.00
Diethylaniline, 850 lb drs lb.	.40	.52	.40	.52	.40 .50
Diethyl Carbinol, drs lb.	.60	.75	.60	.75	.60 .75
Diethylcarbonate, com drs lb.	.31¾	.35	.31¾	.35	.31¾ .35
Diethylorthotoluidin, drs lb.	.64	.67	.64	.67	.64 .67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.19	.19½	.19 .19½
Diethylsulfate, tech, drs, wks, lcl lb.	.13	.14	.13	.14	.13 .14
Diethyleneglycol, drs lb.	.16	.17	.16	.17	.16 .17
Mono ethyl ethers, drs lb.	.15	.16	.15	.16	.15 .16
tks, wks lb.		.14	...	.14	... .14
Mono butyl ether, drs lb.	.23	.24	.23	.24	.23 .24
tks, wks lb.	...	.22	...	.22	... .22
Diethylene oxide, 50 gal drs, wks lb.	.20	.24	.20	.24	.20 .24
Diglycol Laurate, bbls lb.	.16	.17	.16	.23	... .27½
Oleate, bbls lb.	...	.13	.13	.20	... .21
Stearate, bbls lb.	...	.20	.20	.28	... .27½
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis lb.		1.00	...	1.00	... 1.00
Dimethylaniline, 340 lb drs lb.	.23	.24	.23	.24	.23 .27
Dimethyl Ethyl Carbinol, drs lb.	.60	.75	.60	.75	.60 .75

k Higher price is for purified material; * These prices were on a delivered basis.

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COPPER OXIDE (Red)
NICKEL SULPHATE

PHELPS DODGE REFINING CORPORATION
40 Wall Street, New York—230 N. Michigan Avenue, Chicago

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Dimethyl phthalate, drs, wks, frt allowed ..... lb.	...	.19	...	.19	...	.19
Dimethylsulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls lb. *k*	.18	.19	.16	.19	.16	.19
Dinitrochlorobenzene, 400 lb bbls ..... lb.	...	.14	.13½	.14	.13½	.14
Dinitronaphthalene, 350 lb bbls ..... lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls lb.	.22	.23	.22	.24	.23	.24
Dinitrotoluene, 300 lb bbls lb.	...	.15½	...	.15½	...	.15½
Diphenyl, bbls ..... lb.	.15	.25	.15	.25	.15	.25
Diphenylamine ..... lb.	.31	.32	.32	.32	.31	.32
Diphenylguanidine, 100 lb drs ..... lb.	.35	.37	.31	.37	.31	.32
Dip Oil, see Tar Acid Oil.						
Divi Divi pods, bgs shipmt ton	...	nom.	...	nom.	...	nom.
Extract ..... lb.	.05¾	.06¾	.05¾	.06¾	.05	.06¾
E						
Egg Yolk, dom., 200 lb cases lb.	.62	.64	.59	.69	.60	.69
Epsom Salt, tech, 300 lb bbls c-l, NY ..... 100 lb.	1.90	2.10	1.90	2.10	1.90	2.10
USP, c-l, bbls ..... 100 lb.	...	2.10	...	2.10	...	2.10
Ether, USP anaesthesia 55 lb drs ..... lb.	.22	.23	.22	.23	.22	.23
(Conc) ..... lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs ... lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed ..... lb.	...	.06	...	.06	...	.06
Nitrous conc bottles ... lb.	...	.68	...	.68	...	.68
Synthetic, wks, drs ... lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt all'd ..... lb.	...	.061	.051	.061	.051	.05½
drs, frt all'd ..... lb.	...	.071	.061	.071	.061	.06½
99%, tks, frt all'd ... lb.	...	.0685	.0585	.0685	.0585	.06¾
drs, frt all'd ..... lb.	...	.0785	.0685	.0785	.0685	.07¾
Acetoacetate, 110 gal drs lb.	...	.27½	...	.27½	...	.27½
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs ..... lb.	.50	.55	.50	.55	.50	.55
Cellullose, drs, wks, frt all'd ..... lb.	.45	.50	.45	.50	.45	1.00
Chloride, 200 lb drs ... lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys .. lb.	...	.30	...	.30	...	.30
Crotonate, drs ..... lb.	...	.35	.35	.75	1.00	1.25
Formate, drs, frt all'd. lb.	.27	.28	.27	.28	.27	.28
Lactate, drs, wks ..... lb.	...	.33	...	.33	...	.33
Oxalate, drs, wks ..... lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks ..... lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks ..... lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs ..... lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont .... lb.	.75	.85	.75	.85	.75	.85
Anhydrous ..... lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks.. lb.	.16	.20	.16	.21	.17	.21
tks, wks ..... lb.	...	.15	.15	.16	...	.16
Mono Butyl Ether, drs, wks ..... lb.	.18	.22	.18	.22	.20	.21
tks, wks ..... lb.	...	.17	.17	.19	...	.19
Mono Ethyl Ether, drs, wks ..... lb.	.15	.16	.15	.17	.16	.17
tks, wks ..... lb.	...	.14	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks ..... lb.	.13	.14	.13	.14	...	.14
tks, wks ..... lb.	...	.12	.12	.13	...	.13
Mono Methyl Ether, drs wks ..... lb.	.17	.18	.17	.22	.18	.22
tks, wks ..... lb.	...	.16	...	.17	...	.17
Oxide, cyl ..... lb.	.50	.55	.50	.55	.50	.55
Ethylideneaniline ..... lb.	.45	.47½	.45	.47½	.45	.47½
F						
Feldspar, blk pottery .... ton	17.00	19.00	17.00	19.00	17.00	19.00
Powd, blk, wks ..... ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls ..... lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys ..... lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground wks ..... unit *l*	...	4.25	3.00	4.25	2.75	3.30
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis ..... unit *m*	...	3.00	2.35	3.00	2.50	2.50
Fluorspar, 98% bgs ..... lb.	...	31.60	30.00	33.00	...	33.00
Formaldehyde, USP, 400 lb bbls, wks ..... lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour ..... lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines ton	10.00	11.00	10.00	11.00	10.00	11.00
Imp powd, c-l, bgs ...ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb. drs ..... lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.12½	.14	.12½	.14	.12½	.14
Fustic, crystals, 100 lb boxes ..... lb.	.22	.26	.22	.26	.22	.26
Liquid 50°, 600 lb bbls lb.	.09½	.13	.09½	.13	.09½	.13
Solid, 50 lb boxes ..... lb.	.17½	.19½	.17½	.19½	.17½	.19½
G						
G Salt paste, 360 lb bbls.. lb.	.45	.47	.45	.47	.45	.47
Gambier, com 200 lb bgs lb.	...	.07	.06¾	.07¾	.06¾	.07¾
Singapore cubes, 150 lb bgs ..... 100 lb.	...	.10	.08	.10	.08½	.11
Gelatine, tech, 100 lb cs .. lb.	.42	.43	.42	.50	.45	.50
Glauber's Salt, tech, c-l, bgs, wks* ..... 100 lb.	.95	1.18	.95	1.18	.95	1.15
Anhydrous, see Sodium Sulfate						

l + 10; *m* + 50; * Bbls. are 20c higher.

		Current Market		1939 Low	1939 High	1938 Low	1938 High
Glue, bone, com grades, c-l							
bgs	lb.	.12½	.14½	.11½	.14½	.13	.16½
Better grades, c-l, bgs	lb.	.16	.18	.15	.18	.14½	.16½
Glycerin, CP, 550 lb drs	lb.	...	.12½	...	.12½	.12½	.16
Dynamite, 100 lb drs.	lb.	...	nom.	...	.09	.12¾	.16
Saponification, drs	lb.	.09	.10	.08½	.10	.08½	.11¼
Soap Lye, drs	lb.	.07¾	.07⅞	.07½	.07⅞	.07½	.10¼
Glyceryl Bori-Borate, bbls	lb.	...	.40	...	.40	...	.40
Monoricinoleate, bbls	lb.	...	.27	...	.27	...	.27
Monostearate, bbls	lb.	...	.30	...	.30	...	.30
Oleate, bbls	lb.	...	.22	...	.22	...	.22
Phthalate	lb.	...	.37	...	.37	...	.37
Glyceryl Stearate, bbls	lb.	...	.18	...	.18	...	.18
Glycol Bori-Borate, bbls.	lb.	...	.22	.22	.23	...	.26
Phthalate, drs	lb.	...	.38	.38	.40	...	.40
Stearate, drs	lb.	...	.24	.24	.27½	...	.27½
GUMS							
Gum Aloes, Barbadoes	lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.24	nom.	.09	.24	.09	.12
White sorts, No. 1, bgs	lb.	.35	nom.	.23	.35	.23	.28
No. 2, bgs	lb.	.34	nom.	.21	.34	.21	.26
Powd, bbls	lb.	.27	nom.	.12½	.27	.12	.16
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY	lb.	.02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b. NY, drs	ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b. NY	lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases	lb.	.28	.30	.17	.34	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque	lb.	.29½	...	.18¼	.29½	.18¾	.19¼
Dark amber	lb.	.10⅞	nom.	.07⅛	.10⅜	.07⅛	.08⅞
Light amber	lb.	.17	...	.11¼	.17	.11¼	.13¼
Copal, East India, 180 lb bgs							
Macassar pale bold	lb.	.15¼	nom.	.11¾	.15¼	.11¾	.13
Chips	lb.	.08½	nom.	.05⅜	.08½	...	.05⅜
Dust	lb.	.06⅜	...	.03¼	.07⅛	.03½	.04⅛
Nubs	lb.	.13⅜	nom.	.09½	.13¾	.09⅛	.10⅜
Singapore, Bold	lb.	.16⅞	...	.14	.18¼	.14½	.15¼
Chips	lb	.08⅜	...	.05⅝	.10¼	.04¾	.05⅜
Dust	lb.	.06⅛	...	.03¼	.07⅛	.03¼	.04⅛
Nubs	lb.	.12	...	.09⅜	.14⅜	.10	.10⅜
Copal Manila, 180-190 lb baskets, Loba A	lb.	.13⅜	...	.10½	.13⅜	.10½	.12
Loba B	lb.	.13	...	.09¾	.13	.10¼	.11⅝
Loba C	lb.	.12⅝	...	.09	.12⅝	.09¾	.11¼
DBB	lb.	.11	...	.07⅞	.11	.07⅞	.08¾
Dust	lb.	.07¾	...	.05⅛	.07¾	.05⅛	.06⅝
MA sorts	lb.	.09⅝	...	.05⅞	.09⅝	.05⅞	.07¼
Copal Pontianak, 224 lb cases, bold genuine	lb.	.18½	...	.15¼	.18½	.15¼	.16½
Chips	lb.	.09⅛	...	.07⅛	.11½	.08¼	.10¼
Mixed	lb.	.16⅝	...	.13⅜	.16⅝	...	.14
Nubs	lb.	.12¼	...	.10½	.14⅜	.11⅜	.12⅞
Split	lb.	.16⅞	...	.12	.16⅞	.13½	.13⅞
Damar Batavia, 136 lb cases							
A	lb.	.22¾	...	.20	.23¾	.20	.25½
B	lb.	.21⅛	...	.18½	.21⅛	.18½	.24
C	lb.	.15⅝	...	.13½	.15⅝	.14⅞	.20⅜
D	lb.	.14¼	...	.12¼	.14¼	.13⅛	.17½
A/D	lb.	.15¼	...	.12¾	.15¼	.14½	.20⅜
A/E	lb.	.13¾	...	.11⅜	.13¾	.12¼	.17¼
E	lb.	.10	...	.07⅜	.10	.07⅜	.08½
F	lb.	.08¾	...	.07¼	.08¾	...	.07¼
Singapore, No. 1	lb.	.18⅞	...	.13¼	.19½	.15¼	.21⅛
No. 2	lb.	.14⅞	...	.10½	.16⅜	.10⅜	.15⅜
No. 3	lb.	.07¾	...	.05¼	.09⅛	.05	.05¾
Chips	lb.	.12½	...	.09¼	.12½	.09¼	.13½
Dust	lb.	.07¾	...	.05¼	.09⅛	.05	.05¾
Seeds	lb.	.10½	...	.07⅜	.10½	.07⅜	.09½
Elemi, cns, c-l,	lb.	.12⅝	...	.08⅜	.12⅝	.08⅛	.09½
Ester	lb.	.06½	.07	.06	.07	.06¼	.08½
Gamboge, pipe, cases	lb.	.75	.80	.55	.80	.60	.80
Powd, bbls	lb.	.80	.85	.60	.85	.65	.85
Ghatti, sol. bgs	lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls, bxs, drs,	lb.	.14	.33	.14	.33	...	...
Kauri, NY							
Brown XXX, cases	lb.	.60	nom.	.60	.60½	.60	.60½
BX	lb.	.38	nom.	...	.38	...	.38
B1	lb.	.28	nom.	...	.28	...	.28
B2	lb.	.24	nom.	...	.24	...	.24
B3	lb.	.18½	nom.	...	.18½	...	.18½
Pale XXX	lb.	.61	nom.	...	.61	...	.61
No. 1	lb.	.41	nom.	...	.41	...	.41
No. 2	lb.	.24	nom.	...	.24	...	.24
No. 3	lb.	.17¾	nom.	...	.17¾	...	.17¾
Kino, tins	lb.	4.00	4.50	2.50	4.50	2.00	2.75
Mastic	lb.	85	.90	.55	.90	.55	.56
Sandarac, prime quality, 200 lb bgs & 300 lb cks.	lb.	.37	nom.	.15	.37	.19	.26
Senegal, picked bags	lb.	.30	nom.	.25	.30	.23	.27
Sorts	lb.	.13	nom.	.09¼	.13	.09¼	.12
Thus, bbls	280 lbs.	15.00	15.25	13.50	15.25	13.50	14.25
Tragacanth, No. 1, cases	lb.	2.50	nom.	2.25	2.50	2.40	3.00
No. 2	lb.	2.40	nom.	1.90	2.40	2.30	2.75
No. 3	lb.	2.25	nom.	1.60	2.25	1.90	2.70
Yacca, bgs	lb.	.08	nom.	.03½	.08	.03½	.04½
H							
Helium, cyl (200 cu. ft.)	cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls	lb.	.18	.34	.18	.34	.18	.34
Hemlock, 25%, 600 lb bbls, wks	lb.	.03½	.03¾	.03	.03¾	.03	.03¼
tks	lb.	...	.02¾	.02½	.02¼	.02½	.02¼

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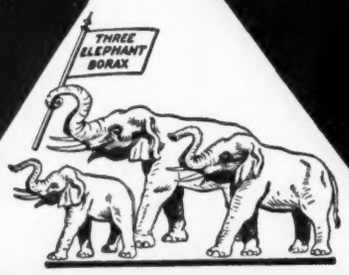

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Prices

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Hexalene, 50 gal drs, wks	lb.	.30	...	.30	...	.30
Hexane, normal 60-70° C. Group 3, tks	gal.	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs	lb.	.32	.32	.36	.35	.36
Hexyl Acetate, secondary, delv, drs	lb.	.13	.13½	.13	.13½	.13	.13½
tks	lb.	...	.12	...	.12		12
Hoof Meal, f.o.b. Chicago unit		...	3.00	2.50	3.25	2.35	3.35
Hydrogen Peroxide, 100 vol, 140 lb cbys	lb.	.19½	.20	.19½	.20	.19½	.20
Hydroxylamine Hydrochloride	lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls	lb.	.13	.16	.13	.21	.16	.21
I							
Indigo, Bengal, bbls	lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid	lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars	lb.	...	2.00	1.75	2.00	1.50	1.75
Irish Moss, ord, bales	lb.	.10	.11	.10	.11	.10	.11
Bleached, prime, bales	lb.	.19	.20	.19	.20	.19	.20
Iron Acetate Liq. 17°, bbls delv	lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.							
Nitrate, coml, bbls 100 lb.		2.32	3.11	2.32	3.11	2.32	3.11
Isobutyl Carbinol (128-132° C) drs, wks	lb.	.33	.34	.33	.34	.33	.34
tks, wks	lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt all'd	lb.	...	.06	.051	.06	.0510	.05½
drs, frt all'd	lb.	...	.07	.061	.07	.061	.07
Ether, see Ether, isopropyl.							
Keiselguhr, dom bags, c-l, Pacific Coast	ton	22.00	85.00	22.00	85.00	22.00	85.00
L							
Lead Acetate, f.o.b. NY, bbls, White, broken	lb.	...	.11	.10	.11	.10	.11
cryst, bbls	lb.	...	.11	.10	.11	.10	.11
gran, bbls	lb.	...	.11¾	.10¾	.11¾	.10¾	.11¾
powd, bbls	lb.	...	.11¾	.10¾	.11¾	.10¾	.11¾
Arsenate, East, drs	lb.	...	.11	.10	.11½	.11	.13½
Linoleate, solid, bbls	lb.	...	.19	...	.19	...	.19
Metal, c-l, NY	100 lb.	5.50	5.55	4.75	5.55	4.00	5.10
Nitrate, 500 lb bbls, wks	lb.	.11	.12	.10	.12	.10	.11½
Oleate, bbls	lb.	.18½	.20	.18½	.20	.18½	.20
Red, dry, 95% Pb_3O_4, delv	lb.	...	.081	.07¼	.08½	.06½	.08
97% Pb_3O_4, delv	lb.	...	.0835	.07½	.0835	.06¾	.081
98% Pb_3O_4, delv	lb.	...	.0860	.07¾	.0860	.07	.0835
Resinate, precip, bbls	lb.	...	.16½	...	.16½	...	.16½
Stearate, bbls	lb.	...	.25	.22	.25	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt all'd	lb.	.11	.11½	.11	.11½	.11	.11½
White, 500 lb bbls, wks	lb.	...	.07	...	.07	.06	.07
Basic sulfate, 500 lb bbls, wks	lb.	...	.06¼	...	.06¼	.05¼	.06¼
Lime, chemical quicklime, f.o.b., wks, bulk	ton	7.00	8.00	7.00	8.00	7.00	8.00
Hydrated, f.o.b. wks	ton	8.50	12.00	8.50	12.00	8.50	12.00
Lime Salts, see Calcium Salts							
Lime sulfur, dealers, tks	gal.	.08	.11½	.08	.11½	.08	.11½
drs	gal.	.11	.16	.11	.16	.11	.16
Linseed Meal, bgs	ton	...	33.50	34.00	42.00	39.00	45.00
Litharge, coml, delv, bbls	lb.	...	.071	.06¼	.071	.05½	.066
Lithopone, dom, ordinary, delv, bgs	lb.	...	.03¾	.03¾	.04½	.04½	.04½
bbls	lb.	...	.04	.04	.04¾	.04¾	.04¾
High strength, bgs	lb.	...	.05¼	.05¼	.05⅝	.05⅝	.06⅛
bbls	lb.	...	.05½	.05½	.05⅞	.05⅞	.06⅜
Titanated, bgs	lb.	...	.05¼	.05¼	.05⅝	.05⅝	.06⅛
bbls	lb.	...	.05½	.05½	.05⅞	.05⅞	.06⅜
Logwood, 51°, 600 lb bbls	lb.	.09½	.11½	.09½	.11½	.09½	.11½
Solid, 50 lb boxes	lb.	.15	.19	.15	.19	.15	.19
Sticks	ton	24.00	25.00	24.00	25.00	24.00	25.00
M							
Madder, Dutch	lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbls	ton	60.00	65.00	58.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks	lb.	...	.06¼	.05¾	.06½	.05¾	.07
Chloride flake, 375 lb drs, c-l, wks	ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks	lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd	lb.	.25	.30	.25	.30	.25½	.30½
Light, bbls above basis	lb.	.20	.25	.20	.25	.20	.25½
USP Heavy, bbls, above basis	lb.	.25	.30	.25	.30	.25	.30½
Palmitate, bbls	lb.	.33	nom.	.33	nom.	...	.33
Silicofluoride, bbls	lb.	.11	.11½	.09½	.11½	.09½	.10½
Stearate, bbls	lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs	lb.	...	.26½	...	.26½	...	.26½
Borate, 30%, 200 lb bbls	lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks	lb.	.08¾	.08¾	.07½	.12	.09	.12
Dioxide, tech (peroxide), paper bags, c-l	ton	...	57.50	47.50	57.50	47.50	62.50
Hydrate, bbls	lb.	...	.32	...	.32	...	.32
Linoleate, liq, drs	lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls	lb.	...	.19	...	.19	...	.19
Resinate, fused, bbls	lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs	lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs	lb.	.08	.08½	.07	.08½	.07	.07½
Mangrove, 55%, 400 lb bbls	lb.	...	...	...	.04	...	.04
Bark, African	ton	...	...	23.00	26.00	23.00	24.50

Current

Mannitol
Nutgalls Alleppo

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Mannitol, pure cryst, cs, wks	lb.	.95	1.00	.95	1.20	1.15	1.45
commercial grd, 250 lb bbl	lb.	.42	.50	.42	.57	...	...
Marble Flour, blk	ton	12.00	14.00	12.00	14.00	12.00	13.00
Mercury chloride (Calomel)	lb.	...	2.57	1.36	2.57	1.18	1.59
Mercury metal ..76 lb. flasks		135.00	137.00	95.00	170.00	73.00	84.50
Mesityl Oxide, f.o.b. dest., tks.	lb.	...	.10½	.10½	.20	...	...
drs, c.l.	lb.	...	.11½	.11½	.21	...	...
drs, l.c.l.	lb.	...	.12	.12	.21½	...	...
Meta-nitro-aniline	lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls	lb.	1.30	1.40	1.30	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls	lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine 300 lb bbls	lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd	gal.	...	.46	.41	.46	.30	.41
tks, frt all'd	gal.	...	.40	.35	.40	.25	.35
Pure, drs, c-l, frt all'd	gal.	...	.38	...	.38	...	.38
tks	gal.	...	.33	...	.33	...	.33
95%, tks	gal.	...	.31	...	.31	...	.31
97%, tks	gal.	...	.32	...	.32	...	.32
Methyl Acetate, tech, tks, delv	lb.	...	.06	.06	.06½	...	.06½
55 gal drs, delv	lb.	.07	.08	.07	.08	.07½	.08
C.P. 97-99%, tks, delv	lb.	...	.06¼	...	.06¼	.06¼	.07
55 gal drs, delv	lb.	.07¼	.07¼	.07¼	.07¼	.07¼	.08½
Acetone, frt all'd, drs	gal. ♦	.41	.44	.30	.44	.30	.40½
tks, frt all'd, drs	gal. ♦	...	.35	.25	.35	.25	.32½
Synthetic, frt all'd. east of Rocky M., drs	gal. ♦	.38	.41	.38	.41	.38	.51
tks, frt all'd	gal.	...	.31½	...	.31½	.31½	.39½
West of Rocky M., frt all'd, drs	gal. ♦	...	.42	...	.42	.42	.46
tks, frt all'd	gal. ♦	...	.35	...	.35	.35	.39½
Anthraquinone	lb.	...	.83	...	.83	...	.83
Butyl Ketone, tks	lb.	...	.10½	...	.10½	...	.10½
Cellulose, 100 lb lots, frt allowed	lb.	...	.70	...	...	...	...
less than 100 lbs, f.o.b. wks	lb.	...	.75	...	...	...	...
Chloride, 90 lb cyl	lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd	lb.	...	.05	...	.05	.05	.06
50 gal drs, frt all'd c-l	lb.	...	.06	...	.06	.06	.07
Formate, drs, frt all'd	lb.	.35	.36	.35	.36	.35	.36
Hexyl Ketone, pure, drs	lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd	lb.	...	.30	...	.30	...	.30
Mica, dry grd, bgs, wks	lb.	...	30.00	...	30.00	30.00	35.00
Michler's Ketone, kgs	lb.	...	2.50	...	2.50	...	2.50
Monoamylamine, c-l, drs, wks	lb.	...	.52	...	.52	.52	1.00
l.c.l. drs, wks	lb.	...	.55	...	...	...	...
tks, wks	lb.	...	.50	...	...	...	...
Monobutylamine, drs, c.l., wks	lb.	...	.50	.50	.65	...	.65
l.c.l., wks	lb.	...	.53	...	...	...	...
tks, wks	lb.	...	.48	...	...	...	...
Monochlorobenzene, see "C"							
Monoethanolamine, tks, wks	lb.	...	.23	...	.23	...	.23
Monoethylamine (100% basis) lcl, drs, f.o.b. wks	lb.	...	.65	...	...	...	...
Monomethylamine, drs, frt all'd, E. Mississippi, c-l	lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs	lb.	3.75	4.00	3.75	4.00	3.75	4.00
Morpholine, drs 55 gal, lcl wks	lb.	...	.75	...	...	...	...
Myrobalans 25%, liq bbls	lb.	...	...	.03¾	.04¼	.03¾	.04¼
50% Solid, 50 lb boxes	lb.	...	...	.04¼	.05	.04⅜	.06¼
J1 bgs	ton	...	50.00	24.00	50.00	23.50	30.00
J2 bgs	ton	...	41.00	19.00	41.00	17.00	22.00
N							
Naphtha, v.m.&p. (deodorized) see petroleum solvents.							
Naphtha, Solvent, water-white, tks	gal.	...	.26	...	.26	.26	.31
drs, c-l	gal.	...	.31	...	.31	.31	.36
Naphthalene, dom, crude bgs, wks	lb.	2.50	2.60	2.25	2.85	2.25	2.85
Imported, cif, bgs	lb.	...	...	1.50	1.85	1.40	2.25
Balls, flakes, pks	lb.	...	.07½	.06½	.07½	.06½	.08
Balls, ref'd, bbls, wks	lb.	...	.06¾	.05¾	.06¾	.05¾	.07¼
Flakes, ref'd, bbls, wks	lb.	...	.06¾	.05¾	.06¾	.05¾	.07¼
Nickel Carbonate, bbls	lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls	lb.	.18	.20	.18	.20	.18	.20
Metal ingot	lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY	lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs	lb.	...	.70	.70	.76	...	.76
Nitre Cake, blk	ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks	lb.	.08	.10	.08	.10	.08	.10
tks	lb.	...	.07	.07	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks	lb.	.22	.29	.22	.29	.22	.29
Nitrogen Sol. 45½% ammon., f.o.b. Atlantic & Gulf ports, tks, unit ton, N basis	...	...	1.2158	...	...	...	...
Nitrogenous Mat'l, bgs, imp unit	...	...	2.85	2.25	2.85	2.35	2.65
dom, Eastern wks	unit	...	3.00	2.30	3.00	2.50	2.75
dom, Western wks	unit	...	2.25	1.90	2.25	2.20	2.35
Nitronaphthalene, 550 lb bbls	lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs	lb.	...	.23	.22	.23	.23	.23

e Country is divided in 4 zones, prices varying by zone; ♦ Country is divided into 4 zones. Also see footnote directly above; q Naphthalene quoted on Pacific Coast F.A.S. Phila., or N. Y.

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89 BICKFORD STREET • BOSTON, MASS.

Oak Bark Extract
Phenylhydrazine Hydrochloride

Prices

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Oak Bark Extract, 25%, bbls lb.	.03⅛	.03⅛	.03⅛	.03½	... .03¼
tks lb.	...	.02¾	...	.02¾	... .02¾
Octyl Acetate, tks, wks lb.	...	.15	.15	.17	.16 .17
Orange-Mineral, 1100 lb cks NY lb.	...	.10¾	.10¼	.10¾	.09½ .10½
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15 2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70 .74
Orthochlorophenol, drs lb.	...	.32	...	.32	.32 .75
Orthocresol, 30.4°, drs, wks lb.	.14½	.15	.14½	.17½	.13½ .17½
Orthodichlorobenzene, 1000 lb drs lb.	.06	.07	.06	.07	.06 .07
Orthonitrochlorobenzene, 1200 lb drs, wks lb.	.15	.18	.15	.18	.15 .18
Orthonitroparachlorphenol, tins lb.	...	.75	...	.75	... .75
Orthonitrophenol, 350 lb drs lb.	.85	.90	.85	.90	.85 .90
Orthonitrotoluene, 1000 lb drs, wks lb.	...	.09	.08	.10	.08 .10
Orthotoluidine, 350 lb bbls, l-c-l lb.	...	.19	.16	.19	16 .17
Osage Orange, cryst, bbls lb.	.19	.25	.17	.25	.17 .25
51° liquid lb.	...	.09	.07	.09	.07 .08
P					
Paraffin, rfd, 200 lb bgs 122-127° M P lb.	.04¼	.04½	.03¾	.04½	.03¾ .04½
128-132° M P lb.	.04	.0485	.04	.0485	.04 .049
133-137° M P lb.	.0515	.0540	.0465	.0540	.0465 .05¼
Para aldehyde, 99%, tech, 110-55 gal drs, wks lb.	.10	.11¼	.10	.16*	.16* .18*
Aminoacetanilid, 100 lb kgs lb.	...	.85	...	.85	... .85
Aminohydrochloride, 100 lb kgs lb.	1.25	1.30	1.25	1.30	1.25 1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	... 1.05
Chlorophenol, drs lb.	.30	.45	.30	.45	.30 .45
Dichlorobenzene, 200 lb drs, wks lb.	.11	.12	.11	.12	.11 .12
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34 .35
Nitroacetanilid, 300 lb bbls lb.	.45	.52	.45	.52	.45 .52
Nitroaniline, 300 lb bbls, wks lb.	.45	.47	.45	.47	.45 .47
Nitrochlorobenzene, 1200 lb drs, wks lb.	.15	.16	.15	.16	.15 .16
Nitro-orthotoluidine, 300 lb bbls lb.	2.75	2.85	2.75	2.85	2.75 2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35 .37
Nitrosodimethylaniline, 120 lb bbls lb.	.92	.94	.92	.94	.92 .94
Nitrotoluene, 350 lb bbls lb.	...	.30	.30	.35	... .35
Phenylenediamine, 350 lb bbls lb.	1.25	1.30	1.25	1.30	1.25 1.30
Toluenesulfonamide, 175 lb bbls. lb.	.70	.75	.70	.75	.70 .75
tks, wks lb.	...	.31	...	.31	... .31
Toluenesulfonchloride, 410 lb bbls, wks lb.	.20	.22	.20	.22	.20 .22
Toluidine, 350 lb bbls, wks lb.	.48	.50	.48	.58	.56 .58
Paris Green, dealers, drs lb.	.23	.26	.23	.26	.23 .26½
Pentane, normal, 28-38° C, group 3, tks gal.	...	.08½	...	.08½	... .08½
drs, group 3 gal.	.11½	.16	.11½	.16	.11½ .16
Perchlorethylene, 100 lb drs, frt all'd lb.	.08	.08¾	.08	.10½	... .10½
Petrolatum, dark amber, bbls lb.	.03	.04½	.02½	.04½	.02½ .03½
Light, bbls lb.	.03¼	.04½	.03½	.04½	.03½ .03½
Medium, bbls lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞ .03⅛
Dark green, bbls lb.	.02½	.02¾	.02½	.02¾	.02½ .02¾
Red, bbls lb.	.02½	.03½	.02½	.03½	.02½ .03½
White, lily, bbls lb.	.06	.07½	.05¼	.07½	.05¼ .07½
White, snow, bbls lb.	.07	.08½	.06¼	.08½	.06¼ .08½
Petroleum Ether, 30-60°, group 3, tks gal.	...	.13½	.13	.13½	... .13
drs, group 3 gal.	.14½	.25½	.14	.25½	.14 .17
PETROLEUM SOLVENTS AND DILUENTS					
Cleaners naphthas, group 3, tks, wks gal.	.06⅞	.07	.06⅜	.07	.06⅜ .07⅜
East Coast, tks, wks gal.	...	.10	...	.10	... .10
Hydrogenated, naphthas, frt all'd East, tks gal.	...	.16	...	.16	... .16
No. 2, tks gal.	...	.18	...	.18	... .18
No. 3, tks gal.	...	.16	...	.16	... .16
No. 4, tks gal.	...	.18	...	.18	... .18
Lacquer diluents, tks, East Coast gal.	...	.09	.09	.12½	.12 .12½
Group 3, tks gal.	.07⅞	.08	.07⅜	.08	.07⅜ .08⅜
Naphtha, V.M.P., East, tks, wks gal.	...	.09	.09	.10	.09½ .10
Group 3, tks, wks gal.	.06⅞	.07	.06⅜	.07	.06⅜ .07⅜
Petroleum thinner, 43-47, East, tks, wks gal.	...	.08½	.08½	.10	.08½ .10
Group 3, tks, wks gal.	.05⅞	.06	.05⅜	.06	.05⅜ .06⅜
Rubber Solvents, stand grd, East, tks, wks gal.	...	.09	.09	.10	.09½ .10
Group 3 tks, wks gal.	.06⅞	.07	.06⅜	.07	.06⅜ .07⅜
Stoddard Solvent, East, tks, wks gal.	...	.08½	.08½	.10	.09½ .10
Group 3, tks, wks gal.	.06⅜	.06½	.05⅞	.06½	.05⅞ .06⅞
Phenol, 250-100 lb drs lb.	.13	.14¾	.13	.15½	.14½ .15½
tks, wks lb.	...	.12	.12	.13½	... .13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs lb.	...	1.35	...	1.35	... 1.35
Phenyl Chloride, drs lb.	...	.17	...	.17	... .17
Phenylhydrazine Hydrochloride, com lb.	...	1.50	...	1.50	... 1.50

* These prices were on a delivered basis.

Current

Phloroglucinol
Rosin Oil

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Phloroglucinol, tech, tins	lb.	15.00	15.00	16.50	15.00	16.50
70% basis	ton	20.00	20.00	22.00	20.00	22.00
72% basis	ton					
75-74% basis	ton	...	...	1.85	...	1.85
75% basis	ton	...	...	2.35	...	2.35
Tennessee, 72% basis	ton	...	...	2.85	...	2.85
Phosphorus Oxychloride 175 lb cyl	lb.	...	...	3.85	...	3.85
Red, 110 lb cases	lb.	...	...	5.50	...	5.50
Sesquisulfide, 100 lb cs	lb.	...	...	4.50	...	4.50
Trichloride, cyl	lb.	.16	.16	.20	.16	.20
Yellow, 110 lb cs, wks	lb.	.40	.40	.44	.40	.44
Phthalic Anhydride, 100 lb drs, wks	lb.	.38 .15	.38 .15	.44 .18	.38 .15	.44 .18
Pine Oil, 55 gal drs or bbls		.24	.24	.30	.24	.30
Destructive dist	lb.					
Steam dist wat wh bbls	gal.	...	...	.14½	...	.14½
tks	gal.					
Pitch Hardwood, wks	ton	46	.46	.48	.46	.55
Coaltar, bbls, wks	ton	...	...	.59	...	.59
Burgundy, dom, bbls, wks	lb.	...	...	.54	...	.54
Imported	lb.	18.25	18.25	18.75	18.25	18.75
Petroleum, see Asphaltum in Gums' Section.		...	...	19.00	...	19.00
Pine, bbls	bbl.	.05½ .15	.05½ .15	.06½ .16	.05½ .15	.06½ .16
Stearin, drs	lb.					
Platinum, ref'd	oz.					
CP, tins	lb.	6.00	6.00	6.25	5.75	6.25
Phosphate Rock, f.o.b. mines		.03	.03	.04½	.03	.04½
Florida Pebble, 68% basis	ton	40.00	32.00	42.00	30.00	39.00
POTASH						
Potash, Caustic, wks, sol	lb.	.06¼	.06¼	.06½	.06¼	.06½
flake	lb.	.07	.07	.07½	.07	.07½
Liquid, tks	lb.	...	...	.02⅞	...	.02⅞
Manure Salts, imported 30% basis, blk	unit	...	...	.58½	...	.58½
Potassium Abietate, bbls	lb.	...	...	.09	.08	.13
Acetate, tech, bbls, delv	lb.	...	...	.26	.26	.28
Bicarbonate, USP, 320 lb bbls	lb.	...	...	.18	...	.18
Bichromate Crystals, 725 lb cks*	lb.	.08¾	.08¼	.09¼	.08¾	.09¼
Binoxalate, 300 lb bbls	lb.	...	...	.23	...	.23
Bisulfate, 100 lb kgs	lb.	.15½	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800 lb cks	lb.	.06½	.06½	.07	.06½	.07
liquid, tks	lb.	...	...	.02⅞	...	.02⅞
drs, wks	lb.	.03	.03	.03½	.03	.03½
Chlorate crys, 112 lb kgs, wks	lb.	.09¼	.09¼	.09½	.09¼	.09½
gran, kgs	lb.	.12	.12	.13	.12	.13
powd, kgs	lb.	.08½	.08¼	.08½	.08¼	.08¾
Chloride, crys, bbls	lb.	.04	.04	.04¼	.04	.04¼
Chromate, kgs	lb.	.19	.19	.28	.19	.28
Cyanide, 110 lb cases	lb.	.50	.50	.55	.50	.57½
Iodide, 250 lb bbls	lb.	...	1.13	1.35	.93	1.13
Metabisulfite, 300 lb bbls	lb.	.18	.11	.18	.12	.15
Muriate, bgs, dom, blk unit		...	...	.53½	...	.53½
Oxalate, bbls	lb.	.25	.25	.26	.25	.26
Perchlorate, kgs, wks	lb.	.09	.09	.10½	.09	.11½
Permanganate, USP, crys, 500 & 1000 lb drs, wks	lb.	.18½	.18½	.19½	.18½	.19½
Prussiate, red, bbls	lb.	...	.30½	.45	.30½	.37
Yellow, bbls	lb.	.15	.14	.16	.15	.16
Sulfate, 90% basis, bgs	ton	...	36.25	38.00	...	38.00
Titanium Oxalate, 200 lb bbls	lb.	.35	.35	.40	.35	.40
Pot & Mag Sulfate, 48% basis bgs	ton	...	24.75	25.75	...	25.75
Propane, group 3, tks	lb.	.03	.03	.04½	.03	.04½
Putty, coml, tubs	100 lb.	...	3.00	6.00	2.25	3.00
Linseed Oil, kgs	100 lb.	...	...	4.50	4.00	4.65
Pyrethrum, conc liq: 2.4% pyrethrins, drs, frt all'd	gal.	7.15	5.75	7.50	5.00	6.75
3.6% pyrethrins, drs, frt all'd	gal.	10.65	8.45	11.00	7.65	9.95
Flowers, coarse, Japan, bgs	lb.	.33	.26	.36	.18	.28½
Fine powd, bbls	lb.	.35	.27	.37	.19	.30
Pyridine, denat, 50 gal drs	gal.	...	...	1.63	1.53	1.63
Refined, drs	lb.	...	...	.50	.45	.50
Pyrites, Spanish cif Atlantic ports, blk	unit	.12	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins	lb.	2.15	2.15	2.75	2.15	2.75
Q						
Quebracho, 35% liq tks	lb.	...	.02⅞	.03½	.03	.03½
450 lb bbls, e-l	lb.	...	.04	.04½	.03½	.04½
Solid, 63%, 100 lb bales cif	lb.	...	.04	.04½	...	.04
Clarified, 64%, bales	lb.	...	.04¼	.04¼	...	.04¼
Quercitron, 51 deg liq, 450 lb bbls	lb	.07½	.07½	.08½	.06	.08½
Solid, drs	lb.	.10	.10	.12	.10	.12
R						
R Salt, 250 lb bbls, wks	lb.	.52	.52	.55	.52	.55
Resorcinol tech, cans	lb.	.75	.75	.80	.75	.80
Rochelle Salt, cryst	lb.	.20¾	.17¾	.21¾	.15	.18¼
Powd, bbls	lb.	.19¾	.16¾	.20¼	.16	.18½
Rosin Oil, bbls, first run	gal.	.45	.45	.47	.45	.60
Second run	gal.	.47	.47	.49	.47	.62
Third run, drs	gal.	.51	.51	.53	.51	.66

* Spot price is ½c higher.

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Aromatic Chemicals

Phosphorescent and Fluorescent Paints

FAIRMOUNT CHEMICAL COMPANY, Inc.
600 Ferry Street — Newark, N. J.

Prices

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:***						
B	...	5.25	4.60	5.40	4.65	6.00
D	...	5.35	4.95	5.70	4.75	6.00
E	...	6.25	5.20	6.40	4.90	6.00
F	...	6.35	5.50	6.75	5.05	7.00
G	...	6.50	5.75	7.00	5.25	7.05
H	...	6.50	5.75	7.10	5.25	7.15
I	...	6.50	5.77½	7.20	5.25	7.15
K	...	6.60	5.80	7.20	5.25	7.25
M	...	6.70	5.90	7.25	5.25	7.40
N	...	6.75	6.75	7.40	6.20	7.50
WG	...	6.95	6.95	7.70	6.75	8.45
WW	...	7.55	7.45	8.50	7.55	9.15
Rosins, Gum, Savannah (280 lb unit):**						
B	...	4.00	3.25	4.00	3.25	4.60
D	...	4.10	3.55	4.30	3.50	4.60
E	...	5.00	3.80	5.00	3.55	4.60
F	...	5.10	4.00	5.35	3.90	5.60
G	...	5.25	4.40	5.70	4.20	5.75
H	...	5.25	4.40	5.70	4.20	5.75
I	...	5.25	4.40	5.80	4.20	5.85
K	...	5.35	4.40	5.80	4.20	6.00
M	...	5.45	4.40	5.85	4.20	6.15
N	...	5.50	5.10	6.00	4.80	6.20
WG	...	5.70	5.60	6.30	5.40	7.05
WW	...	6.30	5.60	7.10	6.10	7.75
X	...	6.30	6.05	7.10	6.10	7.75
Rosin, Wood, c-l, FF grade, NY	4.00	6.80	5.35	6.80	5.05	6.40
Rotten Stone, bgs mines..ton	25.50	37.50	22.50	37.50	22.50	35.00
Imported, lump, bbls ..lb.	...	.14	...	.14	.12	.14
Powdered, bbls .....lb.	.08½	.10	.08½	.10	.08½	.10
S						
Sago Flour, 150 lb bgs...lb.	.04	.04½	.02½	.04½	.02½	.03¼
Sal Soda, bbls, wks ...100 lb.	...	1.20	...	1.20	...	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	25.00	19.00	25.00	19.00	23.00
Chrome, c-l, wks .....ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls .....lb.	.06½	.069	.06½	.069	.06½	.069
Cryst, bbls .....lb.	.07½	.0865	.07½	.0865	.07½	.0865
Powd, bbls .....lb.	.07½	.079	.07½	.079	.07½	.079
Satin, White, pulp, 550 lb bbls .....lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs .....lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls..lb. r	.23	.24	.18	.24	.16½	.20
Garnet, bgs .....lb.	.16	nom.	.12½	.16	.12½	.15
Superfine, bgs .....lb. s	.17	nom.	.10	.17	.11	.13½
T. N., bgs .....lb. s	.16	nom.	.09½	.16	.10½	.12½
Silver Nitrate, vials .....oz.	...	.27	.26⅞	.33½	.33½	.34⅛
Slate Flour, bgs, wks...ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs .....100 lb.	...	1.08	...	1.08	...	1.08
blk .....100 lb.	...	.90	...	.90	...	.90
paper bgs .....100 lb.	...	1.05	...	1.05	...	1.05
bbls .....100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs .....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs ....100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks ..100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs ....lb.	...	.11	...	.11	.10	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls wks .....lb.	.04	.05	.04	.05	.04	.05
anhyd, drs, delv .....lb.	...	.08¼	...	.08¼	...	.08¼
Alginate, drs .....lb.	.71	.95	.70	.95	.69	.70
Antimoniate, bbls .....lb.	.15	.15½	.11½	.16	.12	.15¼
Arsenate, drs .....lb.	.08	.08½	.08	.08½	.08	.08½
Arsenite, liq, drs .....gal.	...	.35	.30	.35	.30	.33
Dry, gray, drs, wks..lb.	.07½	.09½	.07½	.09½	.07½	.09½
Benzoate, USP kgs ...lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks .....100 lb.	...	1.85	...	1.85	...	1.85
Bichromate, 500 lb cks, wks* .....lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.07⅛
Bisulfite, 500 lb bbls, wks lb.	.033	.036	.03¾	.036	.03	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
Chlorate, bgs, wks .....lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks .....lb.	.14	.15	.14	.15	.14	.17½
Diacetate, 33-35% acid, bbls, lcl, delv .....lb.	...	.09	...	.09	...	.09
Fluoride, white 90%, 300 lb bbls, wks .....lb.	.07¼	.08¾	.07¼	.08¾	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks .....lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	...	2.80	2.50	2.80
Tech, reg cryst, 375 lb bbls, wks .....100 lb.	2.45	2.80	2.45	2.80	2.40	2.80
Iodide, jars .....lb.	...	2.30	2.10	2.30	1.90	2.10
Metal, drs, 280 lbs ....lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls..lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks .....100 lb.	...	2.35	2.20	2.35	2.15	2.20
cryst, drs, c-l, wks 100 lb.	...	3.05	2.90	3.05	2.75	2.90
Monohydrated, bbls ....lb.	...	.023	...	.023	...	.023
Naphthenate, drs .....lb.	.12	.19	.12	.19	.12	.19
Naphthionate, 300 lb bbl lb.	...	.50	.50	.54	.52	.54
Nitrate, 92%, crude, 200 lb bgs, c-l, NY .....ton	...	28.30	...	28.30	...	28.30
100 lb bgs .....ton	...	29.00	...	29.00	...	29.00
Bulk .....ton	...	27.00	...	27.00	...	27.00
Nitrite, 500 lb bbls ...lb.	.06¾	.11½	.06¾	.11½	.06¾	.11½

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; s T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher. ** Nov. 17. *** Nov. 17.

	Current Market	1939 Low	1939 High	1938 Low	1938 High
Sodium (continued):					
Orthochlorotoluene, sulfonate, 175 lb bbls, wks lb.	.25	.27	.25	.27	.25	.27
Orthosilicate, 300 lb drs, c.l. lb.	...	2.90	2.90	2.90	2.90	2.90
Perborate, drs, 400 lbs. lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb. lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.30	2.05	2.30	...	2.05
bgs, wks 100 lb.	...	2.10	1.85	2.10	...	1.85
Tri-sodium, tech, 325 lb bbls, wks 100 lb.	...	2.45	2.20	2.45	...	2.20
bgs, wks 100 lb.	...	2.25	2.00	2.25	...	2.00
Picramate, 100 lb kgs. lb.	.65	.67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl, wks lb.	.10½	.10¾	.09½	.10¾	.09	.11½
Pyrophosphate, anhyd, 100 lb bbls f.o.b. wks frt eq lb.	...	.0530	...	.0530	.0530	.10
Sesquisilicate, drs, c-l, wks 100 lb.	...	2.90	2.80	2.90	2.80	3.00
Silicate, 60°, 55 gal drs, wks 100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°,55 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks 100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY lb.	.04¼ nom.		.03½	.04¾	.04¾	.06½
Stannate, 100 lb drs lb.	...	.33½	.30	.35	.25½	.34
Stearate, bbls lb.	.19	.24	.19	.24	.19	.24
Sulfanilate, 400 lb bbls lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks 100 lb. ‡	1.45	1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks lb.	...	.02½	.02¼	.02½	...	.02¼
Solid, 650 lb drs, c-l, wks lb.	...	.03¼	.03	.03½	...	.03
Sulfite, cryst, 400 lb bbls, wks lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls lb.		.12	...	.12	...	.12
Tungstate, tech, crys, kgs lb.	1.05	1.10	1.05	1.10	1.05	1.35
Sorbitol, com, solut, wks						
c-l, drs, wks lb.	...	.15½	...	.15½	.15½	.19
Spruce Extract, ord, tks lb.	...	.01⅛	...	.01⅛	...	.01⅛
Ordinary, bbls lb.	...	.01⅜	...	.01⅜	...	.01⅜
Super spruce ext, tks lb.	...	.01⅜	...	.01⅜	...	.01⅜
Super spruce ext, bbls lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs lb.	...	.04	...	.04	...	.04
Starch, Pearl, 140 lb bgs 100 lb.	...	2.45	2.40	2.85	2.40	3.18
Powd, 140 lb bgs 100 lb.	...	2.55	2.50	2.90	2.50	3.28
Potato, 200 lb bgs lb.	.06	.06¾	.04	.06¾	.03½	.05½
Imp, bgs lb.	.06	nom.	.05	.06	.05	.06
Rice, 200 lb bbls lb.	.07¼ nom.		.06¼	.07¼	.06¼	.07¼
Sweet Potato, 240 lb bbls, f.o.b. plant 100 lb.	7.25	7.50	7.25	7.50	...	...
Wheat, thick, bgs lb.	.05¼ nom.		.05	.05½	.06¼	.07
Strontium carbonate, 600 lb bbls, wks lb.	.24	nom.	.16	.24	.16½	.17
Nitrate, 600 lb bbls, NY lb.	.07¾	.08¼	.07¾	.08¼	.07¾	.09¼
Sucrose octa-acetate, den, grd, bbls, wks lb.	...	.45	...	.45	...	.45
tech, bbls, wks lb.	...	.40	...	.40	...	.40
Sulfur, crude, f.o.b. mines ton	...	16.00	...	16.00	16.00	19.00
Flour, coml, bgs 100 lb.	1.65	2.35	1.65	2.35	1.65	2.35
bbls 100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs 100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls 100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs 100 lb.	2.85	3.00	2.85	3.00	2.85	3.00
Superfine, bgs 100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls 100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs 100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls 100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs 100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls 100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks lb.	.03	.04	.03	.04	.03	.04
Sulfur Dioxide, 150 lb cyl lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks lb.	.04	.05	.04	.05	.04	.05
Refrigeration, cyl, wks lb.	.16	.17	.16	.17	.16	.17
Multiple units, wks lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd ton	85.00	nom.	65.50	85.00	62.00	68.00
Extract, 42°, bbls lb.	...	...	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks ton	...	9.00	8.00	9.00	8.00	9.00
Run of pile ton	...	8.50	7.50	8.50	7.50	8.50
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit ton	...	.70	...	.70	.70	.85
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14.00	16.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30.00	23.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY ton	65.00	70.00	65.00	70.00	65.00	70.00
Tankage Grd, NY unit ‖	...	3.25	2.75	3.25	2.50	3.15
Ungrd unit ‖	...	3.75	2.75	5.00	2.35	3.00
Fert grade, f.o.b. Chgo unit ‖	...	3.25	2.50	4.50	2.25	3.00
South American cif unit ‖	...	4.00	3.00	4.00	3.00	3.45
Tapioca Flour, high grade, bgs lb.	.03	.05	.01¾	.05½	.02	.05½
Tar Acid Oil, 15%, drs gal.	.21	.23	.21	.24	.21	.25½
25%, drs gal.	.25	.27	.25	.28	.25	.29½
Tar, pine, delv, drs gal.	.25	.26	.25	.26	...	.26
tks, delv, E. cities gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech, bbls lb.	.34¾	.35	.27¾	.35	.26¾	.28
USP, bbls lb.	...	.40	.33	.40	.32	.33½
Terpineol, den grade, drs lb.	...	.17	...	.17	...	.17

‡ Bags 15c lower; ‖ + 10; * Bbls. are 20c higher.

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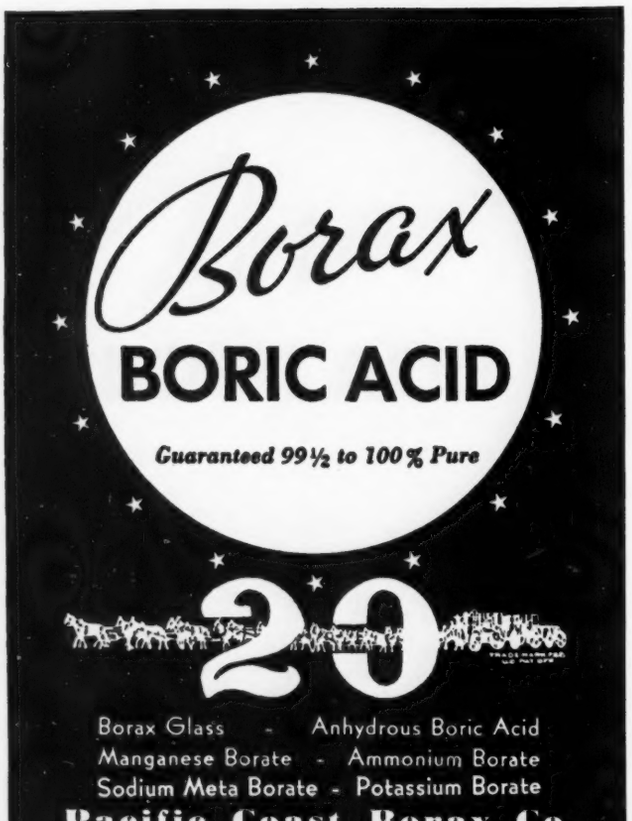

Tetrachlorethane
Zinc Acetate

Prices

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Tetrachlorethane, 650 lb drs	lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene, drs, tech	lb.	...	.09½	...	.09½	...	.09½
Tetralene, 50 gal drs, wks	lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls	lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks	lb.	no prices		.35½	.39	.31	.36½
Metal, NY	lb.	.51	nom.	.4520	.60	.3570	.4675
Oxide, 300 lb bbls, wks	lb.	no prices		.50	.54	.44	.50
Tetrachloride, 100 lb drs, wks	lb.	...	.25	.23	.32	.18½	.23½
Titanium Dioxide, 300 lb bbls	lb.	.13¼	.16	.13¼	.16	.14½	.17
Barium Pigment, bbls	lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Calcium Pigment, bbls	lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Toluidine, mixed, 900 lb drs, wks	lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks	gal.	...	.27	...	.27	.27	.35
8000 gal tks, frt all'd	gal.	...	.22	...	.22	.22	.30
Toner Lithol, red, bbls	lb.	.62	.67	.62	.80	.75	.80
Para, red, bbls	lb.	.75	.80	.75	.80	.75	.80
Toluidine, bgs	lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks	lb.	...	.26	...	.26	...	.36
Triamyl Borate, lcl, drs, wks	lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks	lb.	...	.77	.77	1.25	.77	1.25
lcl, wks, drs,	lb.	...	.80	...	...	...	...
tks, wks,	lb.	...	.75	...	...	...	...
Tributylamine, lcl, drs, wks	lb.	...	.70	...	.70	...	.70
cl, drs, wks	lb.	...	.67	...	...	...	...
tks, wks	lb.	...	.65	...	...	...	...
Tributyl citrate, drs, frt all'd	lb.	...	.35	.35	.45	...	.45
Tributyl Phosphate, frt all'd	lb.	...	.42	...	.42	.42	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts.	lb.	.08	.08¾	.08	.09½	.089	.09½
Tricresyl phosphate, tech, drs	lb.	.22	.36½	.22	.37½	.23	.39
Triethanolamine, 50 gal drs wks	lb.	.21	.22	.21	.22	.21	.22
tks, wks	lb.	...	.20	...	.20	...	.20
Triethylamine, lcl, drs, f.o.b. wks	lb.	...	1.05	...	...	...	...
Triethylene glycol, drs, wks	lb.	...	.26	...	.26	...	.26
Trihydroxyethylamine Oleate, bbls	lb.	...	.30	...	.30	...	.30
Stearate, bbls	lb.	...	.30	...	.30	...	.30
Trimethyl Phosphate, drs, lcl f.o.b. dest	lb.	...	.50	...	.50	...	.50
Trimethylamine, c-l, drs, frt all'd E. Mississippi	lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine	lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs	lb.	...	.38	...	.38	.34	.38
Tripoli, airfloated, bgs, wks	ton	26.00	30.00	26.00	30.00	26.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls	gal.	...	.31¼	**.29	.35*	.26½	.31½
Savannah, bbls	gal.	...	.25¾	.23½	.29*	.20½	.30¾
Jacksonville, bbls	gal.	...	.26*	.23½	.26¾	.20½	.30¾
Wood Steam dist, drs, c-l, NY	gal.	.31½	.34	.242	.34	.242	.31
Wood, dest dist, c-l, drs, delv E. cities	gal.	.23	.25	.22	.25	.22	.36
U							
Urea, pure, 112 lb cases	lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f.	ton						
c.i.f. S.A. points	ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom. f.o.b., wks	ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia, liq., nitrogen basis	ton	...	121.58	...	...	...	...
V							
Valonia beard, 42%, tannin bgs	ton	54.00	nom.	45.00	57.00	45.00	52.00
Cups, 32% tannin, bgs	ton	33.00	37.00	27.00	39.00	30.00	37.50
Extract, powd, 63%	lb.	.05	.06	.05	.06	...	.06
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots	lb.	...	2.60	2.20	2.60	2.10	3.10
Ex-guaiacol	lb.	...	2.50	2.10	2.50	2.00	3.00
Ex-lignin	lb.	...	2.50	2.10	2.50	2.00	2.25
Vermilion, English, kgs	lb.	2.70	2.79	1.50	2.97	1.45	1.69
W							
Wattle Bark, bgs	ton	36.50	40.00	34.50	40.00	36.00	41.75
Extract, 60°, tks, bbls	lb.	...	.04¼	.04	.05½	.04⅜	.04⅝
WAXES							
Wax, Bayberry, bgs	lb.	.38	.39	.16⅞	.39	.16⅞	.17
Bees, bleached, white 500 lb slabs, cases	lb.	.38	.40½	.33	.40½	.35	.45
Yellow, African, bgs	lb.	.29½	.30	.18½	.30	.19	.26
Brazilian, bgs	lb.	.33	nom.	.21	.33	.22	.29
Chilean, bgs	lb.	.33	nom.	.21	.33	.22	.29
Refined, 500 lb slabs, cases	lb.	.31	.36	.25½	.36	.32	.39
Candelilla, bgs	lb.	.18	.19	.15¼	.19	.13½	.16
Carnauba, No. 1, yellow, bgs	lb.	no prices		.36¾	.46½	.38	.44
No. 2, yellow, bgs	lb.	no prices		.35¾	.45	.36	.42
No. 2, N. C., bgs	lb.	no prices		.34	.41	.34	.40
No. 3, Chalky, bgs	lb.	.43	nom.	.27½	.43	.29	.35½
No. 3, N. C., bgs	lb.	.44	.45	.28¾	.45	.30	.35½
Ceresin, dom, bgs	lb.	.09	.12½	.08½	.12½	.08½	.11½
Japan, 224 lb cases	lb.	.17½	.18	.09¾	.18	.09¾	.11
Montan, crude, bgs	lb.	no prices		.11	.11¼	.11	.12¼
Paraffin, see Paraffin Wax.							
Spermaceti, blocks, cases	lb.	.24	.25	.18	.25	.22	.24
Cakes, cases	lb.	.25	.26	.19	.26	.23	.25
Whiting, chalk, com 200 lb bgs c-l, wks	ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks	ton	...	15.00	...	15.00	...	15.00
Wood Flour, c-l, bgs	ton	20.00	30.00	20.00	30.00	20.00	33.00
Xylol, frt all'd, East 10* tks, wks	gal.	...	.29	...	.29	.29	.33
Coml, tks, wks, frt all'd,	gal.	...	.26	...	.26	.26	.30
Xylidine, mixed crude, drs	lb.	.35	.36	.35	.36	.35	.36
Zein, bgs, 1,000 lb lots, wks	lb.	...	.20	...	...	...	...
Zinc Acetate, tech, bbls, lcl, delv	lb.	.15	.16	.15	.21	...	.21

* Nov. 18. ** Nov. 18.

		Current Market	1939 Low	1939 High	1938 Low	1938 High
Zinc (continued):						
Arsenite, bgs, frt all'd	lb.	.12	.12½	.12	.13	.12½ .13
Carbonate tech, bbls, NY	lb.	.14	.15	.14	.15	.14 .15
Chloride fused, 600 lb drs, wks	lb.	.04¼	.046	.04¼	.046	.04¼ .046
Gran, 500 lb drs, wks	lb.	.05	.05¾	.05	.05¾	.05 .05¾
Soln 50%, tks, wks 100 lb.		...	2.25	...	2.25	2.25
Cyanide, 100 lb drs	lb.	...	.33	...	.33	.33 .38
Dust, 500 lb bbls, c-l, delv	lb.	...	.08½	.06½	.08½	.06 .0740
Metal, high grade slabs, c-l, NY	100 lb.	...	5.50	4.84	5.50	4.35 5.45
E. St. Louis	100 lb.	...	5.35	4.60	5.35	4.00 5.05
Oxide, Amer, bgs, wks	lb.	.06¼	.07½	.06¼	.07½	.06 .07½
French 300 lb bbls, wks	lb.	.06½	.07¾	.06½	.07¾	.06¼ .07¾
Palmitate, bbls	lb.	.23	.25	.23	.25	.23 .25
Resinate, fused, pale bbls	lb.	...	.10	...	.10	.10
Stearate, 50 lb bbls	lb.	.21½	.24½	.20	.24½	.20 .23
Zinc Sulfate, crys, 400 lb bbl, wks	lb.	...	.029	...	.029	.029 .033
Flake, bbls	lb.	...	.0325	...	.0325	.0325 .0375
Sulfide, 500 lb bbls, delv	lb.	.07¾	.08	.07¾	.08⅞	.08⅝ .09¾
bgs, delv	lb.	.07½	.07¾	.07½	.08⅝	.08⅜ .09
Sulfocarbolate, 100 lb kgs	lb.	.24	.26	.24	.26	.24 .26
Zirconium Oxide, crude, 73-75% grd, bbls, wks	ton	75.00 100.00		75.00 100.00		75.00 100.00

Oils and Fats

Babassu, tks, futures	lb.	...	.06¾	.05⅞	.07⅝	.06⅛ .06¾
Castor, No. 3, 400 lb drs	lb.	.11¼ nom.		.08¼	.11¼	.09¼ .10¾
Blown, 400 lb drs	lb.	.13¼ nom.		.10¼	.13½	.11¼ .13
China Wood, drs, spot NY	lb.	.25	.27	.15	.28	.10¼ .15½
Tks, spot NY	lb.	.24	.26	.14½	.27	.095 .15½
Coconut, edible, drs NY	lb.	.09⅜	.10⅛	.08⅛	.10⅛	.08⅛ .09½
Manila, tks, NY	lb.	.03¾	.03⅞	.02⅞	.04⅜	.03⅛ .04¼
Tks, Pacific Coast	lb.	...	.03½	.02⅝	.04⅜	.02⅝ .03¾
Cod, Newfoundland, 50 gal bbls	gal.	.72 nom.		.29	.72	.35 .52
Copra, bgs, NY	lb.	...	.0250	.0160	.2625	.0170 .0235
Corn, crude, tks, mills	lb.	.05⅝	.05⅞	.05⅛	.07⅛	.06⅜ .08¼
Refd, 375 lb bbls, NY	lb.	.08½	.08¾	.07½	.09¾	.09¼ .10½
Degras, American, 50 gal bbls NY	lb.	.09½	.10	.07	.10	.07½ .08¼
English, bbls, NY	lb.	.10 nom.		.07	.10	.07½ .08¼
Greases, Yellow	lb.	.05¾	.05⅞	.03⅞	.06¾	.03½ .05½
White, choice, bbls, NY	lb.	.06	.06½	.04½	.07½	.05 .07
Lard, Oil, edible, prime	lb.	...	.10½	.09	.11¼	.10¼ .12¾
Extra, bbls	lb.	...	.09¾	.08	.10⅜	.08¾ .10¾
Extra, No. 1, bbls	lb.	...	.09½	.07¾	.10⅞	.08⅝ .09¾
Linseed, Raw less than 5 bbl lots	lb.	...	.105	.092	.116	.089 .115
bbls, c-l, spot	lb.	.097	.099	.084	.11	.081 .102
Tks	lb.	.091	.093	.078	.104	.07½ .096
Menhaden, tks, Baltimore	gal.	.35 nom.		.21	.35	.34½ .37½
Refined, alkali, drs	lb.	...	.08	.062	.082	.067 .095
Tks	lb.	...	.074	.056	.076	.061 .087
Kettle bodied, drs	lb.	...	.092	.074	.094	.076 .105
Light pressed, drs	lb.	...	.074	.056	.076	.061 .091
Tks	lb.	...	.068	.05	.07	.05½ .08
Neatsfoot, CT, 20°, bbls, NY	lb.	...	.19¼	.14¾	.19¾	.15¼ .17¼
Extra, bbls, NY	lb.	...	.09¾	.08	.10⅛	.08⅝ .10
Pure, bbls, NY	lb.	...	.15¾	.10¾	.16¾	.10¾ .12¼
Oiticica, bbls	lb.	.20	.21	.09¼	.21	.09¼ .12¾
Oleo, No. 1, bbls, NY	lb.	...	.09¼	.07¼	.12	.08½ .10½
No. 2, bbls, NY	lb.	...	.08¾	.06¾	.11¾	.08 .10
Olive, denat, bbls, NY	gal.	1.05	1.15	.82	1.40	.86 1.20
Edible, bbls, NY	gal.	2.10	2.25	1.75	2.25	1.75 2.35
Foots, bbls, NY	lb.	.09	.09½	.06¾	.10	.07 .09⅞
Palm, Kernel, bulk	lb.	no prices		.0340	.036	.0325 .04½
Niger, cks	lb.	...	.05	.03⅝	.05	
Sumatra, tks	lb.	no prices		.0265	.02¾	.02⅝ .0375
Peanut, crude, bbls, NY	lb.	...	.07	.06	.08	.07 .08¼
Tks, f.o.b. mill	lb.	.06¾	.07	.05¼	.07¼	.06⅝ .08
Refined, bbls, NY	lb.	.10½	.10¾	.08¾	.10¾	.09¾ .10¾
Perilla, drs, NY	lb.	.14	.14¼	.09½	.15	.09¾ .11¾
Tks, Coast	lb.	.132	.135	.089	.14	.09 .11
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY	lb.	.17	.17½	.14	.17½	.14 .14¾
Denatured, drs, NY	gal	1.00	1.05	.80	1.05	.75 .91
Red, Distilled, bbls	lb.	.09	.09½	.06¾	.09½	.07⅜ .10⅝
Tks	lb.	...	.08½	.064	.08½	.06½ .09¾
Sardine, Pac Coast, tks	gal	.32 nom.		.24	.38	.28 .46½
Refined alkali, drs	lb.	...	.08	.062	.082	.067 .095
Tks	lb	...	.074	.056	.076	.061 .087
Light pressed, drs	lb.	...	.074	.056	.076	.061 .089
Tks	lb.	...	.068	.05	.07	.05½ .08
Sesame, yellow, dom	lb.	no prices		.09	.10½	.10¼ .10½
White, dom	lb.	no prices		.09	.10½	.10¼ .10½
Soy Bean, crude						
Dom, tks, f.o.b. mills	lb	...	.06	.04½	.06½	.05⅞ .07
Crude, drs, NY	lb	.06⅝	.06⅞	.05⅛	.07⅛	.06½ .08
Ref'd, drs, NY	lb.	.07⅞	.08⅜	.06⅛	.08⅛	.07⅝ .097
Tks	lb.	...	.07¼	.05¾	.07¾	.0685 .082
Sperm, 38° CT, bleached bbls NY	lb.	...	.103	.09	.103	.10 .102
45° CT, bleached, bbls, NY	lb.	...	.096	.083	.096	.093 .095
Stearic Acid, double pressed dist bgs	lb.	.12½	.13½	.10	.13½	.10 .12
Double pressed saponified bgs	lb.	.12¾	.13¾	.10¼	.13¾	.10¼ .12¼
Triple pressed dist bgs	lb.	.15½	.16½	.12¾	.16½	.13 .15
Stearine, Oleo, bbls	lb.	.07¾	.08	.05½	.12	.05½ .08½
Tallow City, extra loose	lb.	.06 nom.		.04⅜	.07	.04¾ .06¾
Edible, tierces	lb.	.06¾ nom.		.04½	.07¾	.06 .07⅝
Acidless, tks, NY	lb.	...	.08¾	.07	.09¼	.07¼ .09¼
Turkey Red, single, drs	lb.	no prices		.06	.08⅝	.06¼ .08½
Double, bbls	lb.	no prices		.08¾	.10⅞	.09½ .13
Whale:						
Winter bleach, bbls, NY	lb.	...	.095	.075	.095	.081 .10
Refined, nat, bbls, NY	lb	...	.091	.071	.091	.077 .096

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"We"—Editorially Speaking

A Joyous and Merry Christmas to you and yours!

❖❖❖❖

And a Happy and Prosperous New Year.

❖❖❖❖

And while on the subject of the holidays were you one of those who celebrated a "Frank's-giving"?

❖❖❖❖

Formulating plans for our two Silver Jubilee Issues and carrying them into execution brought us a great deal of pleasure and satisfaction and naturally aroused in our minds many varied thoughts concerning CHEMICAL INDUSTRIES. Our first issue consisted of but 16 pages—this December issue contains 154 pages including inserts and covers. The first number 25 years ago did not carry a single line of advertising—this issue has approximately 62 or 63 pages calling to your attention the products of over 90 companies. Not being the official organ of any group, association or society, CHEMICAL INDUSTRIES has been entirely dependent upon its loyal readers. To its host of "old" subscribers and its many new ones we owe a great debt of gratitude. We believe that the very best way that we can repay this debt is to continue to improve and enlarge the services of CHEMICAL INDUSTRIES in every logical possible way.

The fact that this number contains the largest amount of advertising ever carried by any monthly issue of "C. I.", and has, we believe, the largest or very close to the largest amount of chemical company advertising ever to be carried by any monthly issue of any publication, is definite indication of the respect and loyal support of American chemical business. We cherish the respect and friendship of our advertisers. Without their loyal support, confidence in the editorial value of "C. I." to its readers, we could not have gone on each year constantly enhancing the value of the magazine editorially. We are proud to say that we, your editors, have kept faith with you, our readers. That we, or our successors, may be able to say the same on the Golden Anniversary of the paper is at once both our greatest single wish and our primary goal.

Fifteen Years Ago

From our files of Dec., 1924

Dr. Charles L. Reese, Du Pont, is elected president of the A. I. Ch. E. for 1925.

Mathieson Alkali to spend over $2,000,000 for plant expansion and improvements.

Commercial Solvents plans to double capacity at its Peoria (Ill.) refinery, in response to the growing demand for butanol.

Francis J. McDonough, a director of McK. & R., becomes president of N. Y. Quinine & Chem. Works, in the reorganization of McK. & R. interests.

Prof. James F. Norris, M. I. T., succeeds Dr. Leo H. Baekeland as president of the A. C. S.

❖❖❖❖

The recent remark of Dr. Webster N. Jones, president of the A.I.Ch.E., upon being reelected for a second term, "I wish to say now that I do not choose to run for a third term," was classic in view of a certain existing political uncertainty. Washington papers please copy!

❖❖❖❖

And may we congratulate the officers of the Woonsocket Rayon Company. The Wanskuk Company, Cranston Print Works, and other concerns who opened their plants for inspection by the Chemical Engineers. We mention these plants, particularly, only because these happen to be the inspection trips we personally made. We understand that in every instance the Engineers were permitted to see a great deal more than is usually permitted on plant inspections. You know the general formula—the back-end of the boiler room, the shipping department and a grand rush through the rest of the plant. It was refreshing to have questions answered so well and so completely. We heard in Providence that the Plant Visits Committee actually made a pre-visit to each plant, suggesting here and there where more information and closer view of operations should be given.

❖❖❖❖

"A man may be down but he is never out." This might easily be said of some raw materials and specifically shellac. Dr. Wm. Howlett Gardner, Research Professor of Chemical Engineering, and Supervisor of the shellac investigational work being done at Brooklyn "Poly," indicates quite clearly in his article "Newer Uses for Shellac" that the proper scientific approach may well mean a new and useful lease of life for many of the natural raw materials that appear to be "on the ropes" and at the mercy of new synthetics. Dr. Gardner received his B.S. in chemistry at Cornell, his M.S. at Dartmouth, and the Ph.D. at Cornell. His hobby is sketching.

❖❖❖❖

In view of the turmoil going on in many parts of the world and the sad state of personal, political and religious freedom in those sections, we hardly think that two Thanksgiving Days are one too many.

❖❖❖❖

Headline in Nov. 24 issue of *The World-Telegram*, N. Y., reads, "Cities Filled with Wafer Women."

❖❖❖❖

A good friend of "C. I." phoned "Editorial We" right after he had read in the November issue that C. L. Gabriel of Commercial Solvents was preparing an article for the December number on the nitroparaffins to say that the word "SCOOP" should be written in big red letters right across the first page.

❖❖❖❖

But that isn't the only scoop you'll find in this issue. W. C. Goggin's article on Dow's styron developments and the discussion of the new hydrogenated coal-tar chemicals are two others that could carry the same label. And just to indicate that scoops are more or less regular diet for steady readers of "C. I.," we promise in January the first printed word on Columbia Alkali's new caustic soda developments. This article was not quite ready for the early publication "deadline" made necessary by the Chemical Exposition this month.

Be Sure To See "New Chemicals for Industry"

A hearty welcome awaits each and every reader of *Chemical Industries* at our Booth 28 (Main Floor) at the Exposition of Chemical Industries during the week of December 4-9, Grand Central Palace, New York City.

Be sure to visit with us, stop and rest, let us find out for you the answers to those knotty questions that are bothering you. Don't miss the display of the 387 "New Chemicals for Industry"—shown at our booth—disinterested observers call it "The Hit of the Show." We'd like to have your personal reaction.

We'll be celebrating our 25th Birthday—Won't you come to our party? We'll be expecting you!

State of Chemical Trade

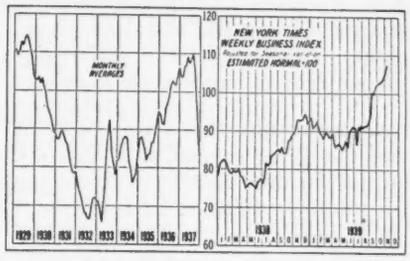
Current Statistics (Nov. 21, 1939)—p. 47

WEEKLY STATISTICS OF BUSINESS

Week Ending	Carloadings 1939	Carloadings 1938	Carloadings % of Change	Electrical Output* 1939	Electrical Output* 1938	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Chem. & Drugs	Fertilizer Fats & Oils	Ass'n Fert. Mat.	Price Indices Mixed Fert.	Price Indices All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
Nov. 4	805,862	672,967	+19.7	2,536,765	2,207,444	+14.9	81.6	93.5	52.4	73.0	77.3	77.6	77.7	93.0	105.5	119.1
Nov. 11	785,961	636,446	**+23.5**	2,513,688	2,209,324	+13.8	81.1	93.5	52.5	73.0	77.3	77.5	...	93.5	...	119.2
Nov. 18	.....	.....	.....	.....	.....	.....	...	...	...	...	...	...	...	...	...	...
Nov. 25	.....	.....	.....	.....	.....	.....	...	...	...	...	...	...	...	...	...	...

*K.W.H., 000 omitted †1926-1928 = 100.0. *Bold-faced indices represent new peaks for* 1939.

INDUSTRIAL TRENDS



Business: National industrial production during the first half of November approached, and possibly exceeded, its previous record high (Fed. Res. B. Ind. for October—120), a Federal Reserve Board survey of business and financial conditions indicated on Nov. 17.

Automotive: Output in the week ended Nov. 18 was 86,700 units, compared with 86,200 in the previous week. November is expected to remain steady around present levels; but for the Chrysler strike, it might be expected to reach record levels.

Steel: Operations remain at above 90%, with no indication of slacking off in the balance of the year.

Chemical: Growth of the chemical industry in the past two years is indicated by Du Pont earnings which for the entire '39 year, may top $7.80 a share, compared with $7.29 in the previous record year of '37. Fourth quarter sales are said to be running at least 25% over the second period; chemical earnings for the first three quarters of this year are more than 50% better than for the like 9-month period of '38.

Retail Trade: A marked increase in employment and pay rolls was largely responsible for boosting October's sales volume to over $301,000,000, more than 10% better than in the same month a year ago. Department store sales in the week ended Nov. 11 registered a 7% gain over the like '38 period. Aided by fine weather, N. Y. City sales increased 14.6% over the corresponding '38 week.

Wholesale Trade: Pushing ahead the Thanksgiving Day date in certain states is expected to boom the Christmas trade earlier and wholesalers re-

MONTHLY STATISTICS

CHEMICAL:	Oct. 1939	Oct. 1938	Sept. 1939	Sept. 1938	August 1939	August 1938
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	.....	.....	153,897	133,266	161,791	131,106
Consumpt. in mfr. fert.	.....	.....	134,287	126,974	115,119	128,312
Stocks end of month	.....	.....	74,113	88,165	72,536	85,787
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal.	.....	.....	18,104,019	15,759,159	18,538,531	17,421,405
Comp. denat. prod., wine gal.	.....	.....	2,101,669	2,602,376	580,681	1,502,076
Removed, wine gal.	.....	.....	2,182,218	2,553,002	481,462	1,464,124
Stocks end of mo., wine gal.	.....	.....	685,736	862,733	767,661	815,966
Spec. denat. prod., wine gal.	.....	.....	10,523,011	6,555,095	8,608,994	6,343,617
Removed, wine gal.	.....	.....	10,665,877	6,554,118	8,720,379	6,202,383
Stocks end of mo., wine gal.	.....	.....	1,090,504	600,593	1,239,265	606,899
Ammonia sulfate prod., tons *a*	.....	.....	52,834	36,403	50,565	34,841
Benzol prod., gal. *b*	.....	.....	9,435,000	6,056,000	8,797,000	5,585,000
Byproduct coke, prod., tons *a*	.....	.....	3,904,321	2,675,089	3,666,068	2,494,471
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	.....	.....	861,073	691,688	759,235	725,363
Sheets, ship., lbs.	.....	.....	840,886	722,699	741,297	722,518
Rods, prod., lbs.	.....	.....	219,012	209,256	243,985	198,860
Rods, ship., lbs.	.....	.....	239,439	233,921	244,699	235,948
Tubes, prod., lbs.	.....	.....	84,253	74,937	65,426	52,283
Tubes, ship., lbs.	.....	.....	76,123	75,702	79,332	58,209
Cellulose acetate, sheets, rod, tubes						
Production, lbs.	.....	.....	705,640	592,079	1,041,430	546,422
Shipments, lbs.	.....	.....	676,669	615,549	814,634	529,529
Molding comp., ship.; lbs.	.....	.....	1,152,791	759,027	967,367	484,022
Methanol (Bureau of the Census)						
Production, crude, gals.	.....	.....	404,876	303,225	359,594	281,988
Production, synthetic, gals.	.....	.....	2,639,934	1,929,655	2,678,983	1,897,847
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds.	.....	.....	3,291,353	2,427,796	2,819,719	2,481,425
Heavy goods, ship., linear yds.	.....	.....	2,515,824	1,961,017	2,323,008	1,947,342
Pyroxylin spreads, lbs. *c*	.....	.....	6,243,461	4,998,483	5,580,850	4,848,722
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*	$19,774	$13,254	$20,000	$14,300	$15,000	$12,000
Crude sulfur *d*	.....	.....	$874	$1,321	$1,450	$457
Coal-tar chemicals *d*	.....	$890	$1,114	$1,021	$1,105	$526
Industrial chemicals *d*	.....	$2,511	$4,152	$1,940	$2,391	$2,117
Imports						
Chemicals and related prod. *d*	.....	$8,048	$11,338	$13,000	$11,224	$10,480
Coal-tar chemicals *d*	.....	$1,494	$1,494	$1,623	$1,037	$964
Industrial chemicals *d*	.....	$1,750	$1,254	$1,732	$967	$1,523
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100) Adjusted to 1937 Census Totals						
Chemicals and allied prod., including petroleum	.....	.....	117.6	114.6	109.1	109.3
Other than petroleum	.....	.....	116.2	112.7	105.7	106.0
Chemicals	.....	.....	123.7	114.5	119.1	112.2
Explosives	.....	.....	99.9	88.6	93.3	85.5
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100) Adjusted to 1937 Census Totals						
Chemicals and allied prod., including petroleum	.....	.....	124.4	118.1	118.9	116.0
Other than petroleum	.....	.....	121.2	112.9	113.6	109.2
Chemicals	.....	.....	139.7	123.6	136.1	123.2
Explosives	.....	.....	114.4	97.6	109.1	97.6
Price index chemicals	.....	.....	81.2	81.0	77.5	81.4
Chem. and drugs	.....	.....	77.3	77.3	74.6	77.7
Fert. mat.	.....	.....	69.2	67.2	67.2	67.3
Paint and paint mat.	.....	.....	84.7	80.4	82.1	80.5
FERTILIZER:						
Exports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials	.....	.....	123,792	116,828	141,171	146,636
Ammonium sulfate	.....	.....	6,973	4,573	5,672	5,579
Total phosphate rock	.....	.....	58,113	78,233	98,580	102,919
Total potash fertilizers	.....	.....	17,214	4,189	5,579	8,443
Imports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials	.....	.....	87,434	128,389	75,485	77,452
Ammonium sulfate	.....	.....	19,223	21,440	11,161	9,374
Sodium nitrate	.....	.....	10,445	20,829	9,481	24,450
Total potash fertilizer	.....	.....	15,877	42,407	29,087	27,906

State of Chemical Trade
Current Statistics (Nov. 21, 1939)—p. 47

State of Chemical Trade

Current Statistics (Nov. 21, 1939)—p. 48

MONTHLY STATISTICS (cont'd)

	Oct. 1939	Oct. 1938	Sept. 1939	Sept. 1938	August 1939	August 1938
FERTILIZER: (Cont'd)						
Superphosphate e (Nat. Fert. Association)						
Production, bulk	.....	.....	257,987	229,961	231,128	231,979
Shipments, total	.....	.....	351,057	334,084	155,780	146,963
Northern area	.....	.....	281,374	261,181	104,123	92,043
Southern area	.....	.....	69,683	72,903	51,657	54,920
Stocks, end of month, total	.....	.....	1,151,976	1,295,213	1,197,822	1,373,277
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	210,116	131,199	215,877	226,692	154,865	128,701
Total, 12 southern	190,065	121,480	148,250	140,057	42,992	44,805
Total, 5 midwest	20,050	9,719	67,267	86,635	111,873	83,896
Fertilizer employment *i*	.....	.....	99.5	92.1	73.9	77.3
Fertilizer payrolls *i*	.....	.....	87.6	77.7	62.7	65.6
Value imports, fert. and mat. *d*	.....	.....	$1,983	$3,427	$1,711	$1,842
GENERAL:						
Acceptances outst'd'g *f*	.....	$269	$215	$261	$235	$258
Coal prod., anthracite, tons	4,557,000	3,518,678	4,776,000	3,388,000	3,832,000	2,336,498
Coal prod., bituminous, tons	41,574,000	34,900,000	37,695,000	32,286,000	34,688,000	28,710,000
Com. paper outst'd'g *f*	.....	$213	$209	$212	$201	$209
Failures, Dun & Bradstreet	916	997	758	866	859	1,015
Factory payrolls *i*	.....	.....	93.7	81.6	96.4	88.8
Factory employment *i*	.....	.....	100.1	92.0	89.9	77.3
Merchandise imports *d*	.....	.....	$181,461	$167,592	$175,756	$165,516
Merchandise exports *d*	.....	.....	$288,573	$246,361	$250,839	$230,790
GENERAL MANUFACTURING:						
Automotive production	.....	.....	188,751	83,534	99,868	90,494
Boot and shoe prod., pairs	.....	.....	35,901,635	38,280,231	43,580,655	42,252,371
Bldg. contracts, Dodge *j*	$261,120	$357,698	$323,227	$300,900	$312,328	$313,141
Newsprint prod., U. S. tons	78,591	72,827	77,309	68,315	80,000	67,436
Newsprint prod., Canada, tons	280,985	254,872	253,230	231,940	236,975	220,303
Glass Containers, gross‡	.....	.....	4,250	.....	4,753	4,178
Plate glass prod., sq. ft.	.....	.....	13,662,855	8,873,344	10,450,000	7,676,078
Window glass prod., boxes	.....	.....	913,980	882,595	867,452	433,877
Steel ingot prod., tons	5,393,821	3,105,000	4,231,000	2,657,748	3,763,000	2,537,000
% steel capacity	90.1	52.45	73.0	44.8	61.9	42.9
Pig iron prod., tons	3,627,590	2,067,000	2,878,556	1,680,435	2,695,913	1,493,000
U.S. cons'pt. crude rub., lg. tons	55,764	40,333	50,150	37,823	50,481	38,170
Tire shipments	.....	.....	5,565,356	3,887,604	4,919,140	3,990,591
Tire production	.....	.....	4,984,505	3,915,873	5,491,664	4,037,715
Tire inventories	.....	.....	8,334,660	8,022,430	8,890,793	8,216,612
Cotton consumpt., bales	686,936	543,857	624,902	533,399	628,448	561,406
Cotton spindles oper.	.....	.....	22,231,976	22,183,972	22,012,186	22,152,526
Silk deliveries, bales	.....	.....	36,869	38,844	33,095	38,504
Wool Consumption *s*	.....	.....	36.2	28.5	38.9	33.2
Rayon deliv., lbs.	34,100,000	.....	32,800,000	35,800,000	31,300,000	36,700,000
Hosiery (all kinds) *t*	.....	.....	9,101,774	8,465,143	9,757,740	8,291,021
Rayon employment *i*	.....	.....	300.3	302.2	255.1	281.8
Rayon payrolls *i*	.....	.....	286.5	282.1	246.6	264.5
Soap employment *i*	.....	.....	88.1	82.5	86.0	80.8
Soap payrolls *i*	.....	.....	106.5	98.4	102.3	94.9
Paper and pulp employment *i*	.....	.....	108.6	104.0	107.0	102.8
Paper and pulp payrolls *i*	.....	.....	112.6	101.6	107.7	102.0
Leather employment	.....	.....	86.4	79.8	85.5	78.5
Leather payrolls *i*	.....	.....	84.3	76.7	83.1	75.7
Glass employment *i*	.....	.....	100.0	87.4	98.5	83.7
Glass payrolls *i*	.....	.....	104.6	86.7	102.9	91.7
Rubber prod. employment *i*	.....	.....	86.0	75.8	82.6	72.3
Rubber prod. payrolls *i*	.....	.....	91.4	74.8	86.0	67.7
Dyeing and fin. employment *i*	.....	.....	124.9	114.3	122.2	111.8
Dyeing and fin. payrolls *i*	.....	.....	107.5	98.1	103.3	95.8
MISCELLANEOUS:						
Oils & Fats Index ('26 = 100)	62.5	58.6	67.0	59.5	48.1	60.6
Gasoline prod., *p*	49,000	49,489	51,890	48,300	52,161	50,071
Cottonseed oil consumpt., bbls.	.....	.....	444,743	261,879	305,000	347,000
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	.....	.....	$38,468,830	$31,046,584	$34,448,530	$30,182,013
Trade sales (580 establishments)	.....	.....	$21,485,810	$17,431,211	$19,046,555	$17,224,845
Industrial sales, total	.....	.....	$13,398,357	$10,492,087	$12,153,308	$9,894,867
Paint & Varnish, employ. *i*	.....	.....	123.1	117.2	122.1	115.2
Paint & Varnish, payrolls *i*	.....	.....	126.9	116.7	125.6	113.4

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100, adjusted to 1937 census totals; *j* 000 omitted, 37 states; *p* Thousands of barrels, 42 gallons each; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *t* 384 identical manufacturers, Bureau of the Census, quantity expressed in dozen pairs; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Units are millions of lbs.; ‡ 000 omitted.

port a heavy demand for most seasonal items. Retailers in the Mid-West and South are stocking in heavier volume than last year. Volume of wholesale trade during the first 9 months is reported by the Secretary of Commerce at $15,000,000,000, a gain of $1,000,000,000 over the same period of '38.

Textiles: All branches of the industry report adherence to heavy production schedules. Output of rayon is specially heavy and at record proportions. Textile buying at the moment shows definite signs of slackening.

Construction: Not since April, '37, has the dollar volume of private residential building been equal to the total recorded for October, according to F. W. Dodge Corp. in its current report on construction contracts awarded in the 37 Eastern States. Total residential construction, including both private and public, amounted to $118,303,000 in October and exceeded the corresponding month of last year by $5,630,000.

Electric Output: Output for the week ended Nov. 11 was 13.8% above the corresponding week of a year ago.

Paper: Production continues to show further expansion. Output and shipments in October reached the highest monthly totals since December of 1937.

Carloadings: Weekly figures continue to show wide advances over the like periods of last year. The Nov. 11 total for example, showed a gain of 23.5%.

Leather: Current operations are at the year's highest point. However, some slackening may take place in the last half of December.

Commodity Prices: All of the accepted indices of wholesale prices showed some losses in the first three weeks of the past month.

Glass: No slackening of current operations is expected for several weeks.

Outlook: A slight decline in manufacturing operations appeared likely in the final week of November caused by the holiday period, but aside from this, there appears to be no likelihood of any curtailment of any sizable proportions until the last two weeks of December. Recent events abroad seem to point to the fact that a real war is in progress and that there is little hope that a quick decision will be reached. Shipping conditions are still pretty much in chaos and the difficulties of import and export have in the past few weeks become more difficult.

Earnings Statements Summarized

Company:	Annual dividends	Net income 1939	Net income 1938	Common share earnings 1939	Common share earnings 1938	Surplus after dividends 1939	Surplus after dividends 1938
Air Reduction Co.:							
Sept. 30 quarter	y$1.50	$1,291,816	$962,273	$.50	$.37	.....	.....
American Agricultural Chemical Co.:							
Sept. 30 quarter	y 1.35	†94,633	†162,339	...	...	.....	.....
Atlas Powder Co.:							
Sept. 30 quarter	y 2.25	381,929	278,085	1.19	.77	.....	.....
Certain-Teed Products Corp.:							
September 30 quarter	f	346,600	195,729	.38	.14	.....	.....
Nine months, Sept. 30	f	348,592	112,761	.03	p1.54	.....	.....
Columbian Carbon Co.:							
‡Sept. 30 quarter	y 4.50	746,731	567,387	1.39	1.05	.....	.....
Commercial Solvents Corp.:							
Sept. 30 quarter	f ...	473,520	163,359	.18	.06	.....	.....
Corn Products Refining:							
Sept. 30 quarter	y 3.00	2,868,145	2,066,488	.96	.65	.....	.....
du Pont de Nemours & Co., E.I.:							
Sept. 30 quarter	y 5.25	22,926,709	12,350,713	1.91	.95	$6,910,910	$1,863,495
Freeport Sulphur Co.:							
Sept. 30 quarter	y 1.50	383,216	393,505	.48	.49	.....	.....
Hercules Powder Co.:							
Sept. 30 quarter	y 1.80	1,377,091	741,501	.95	.46	.....	.....
Interchemical Corp.:							
‡Sept. 30 quarter	y .40	382,736	201,645	.98	.35	.....	.....
Mathieson Alkali Works, Inc.:							
Sept. 30 quarter	1.50	288,722	337,408	.29	.36	.....	.....
Monsanto Chemical Co.:							
Sept. 30 quarter	2.00	1,296,914	690,743	.96	.51	.....	.....
Paraffine Companies, Inc.:							
Sept. 30 quarter	y 2.00	481,971	336,403	.96	.66	.....	.....
Union Carbide & Carbon Corp.:							
Sept. 30 quarter	y 1.90	8,400,328	5,451,980	h.92	h.60	.....	.....
United Carbon Co.:							
‡Sept. 30 quarter	3.00	266,854	330,857	.67	.83	.....	.....
United Carbon Co.:							
‡September 30 quarter	3.00	266,854	330,857	.67	.83	.....	.....
Victor Chemical Works:							
Sept. 30 quarter	y 1.10	298,801	219,250	.43	.31	.....	.....
Westvaco Chlorine Products Corp.:							
Sept. 30 quarter	y 1.85	343,517	207,993	.80	.40	.....	.....

† Net loss. ‡ Indicated quarterly earnings as shown by a comparison of company's reports for six and nine months periods. *f* No common dividend. *h* On shares outstanding at close of respective periods. *p* On preferred stock. *q* On combined preferred stocks. *y* Amount paid or payable in 12 months to and including the payable date of the most recent dividend announcement. ‡ Indicated quarterly earnings, by comparison of company's reports for the 6 and 9 months periods.

Chemical Stocks Rally in Mid-November

As shown in the tabular summary below, 15 leading chemical stocks made up in part some of the decline of earlier in November. On the first of last month, these same stocks were from one-half to five points below their quoted value as of October 1.

	Nov. 4	Nov. 10	Nov. 18
Air Reduction	59⅝	56½	56½
Allied	178	173¾	178½
Amer. Cyan. "B"	31⅛	31½	31¾
Amer. Agric. Ch.	21¼	19⅛	20⅝
Columbian	91½	90	92⅝
Comm'l Solv.	13⅛	12	12½
Dow	137⅛	138	136
Du Pont	180¾	177	179⅝
Hercules	83	83½	85
Mathieson	31½	29	30⅜
Monsanto	108¾	106	108
Std. of N. J.	48¼	47½	46⅞
Texas Gulf	35	33¼	34⅝
Union Carbide	88⅛	86⅝	88½
U. S. I.	24¼	22	24

Chemical Fund
Inc.

Prospectus on request

F. EBERSTADT & CO.
Incorporated
39 BROADWAY, NEW YORK CITY

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Chemicals Show 53% Gain in 9 Months of 1939

Continuing its progress as an "all-weather" industry in the third quarter of 1939, the chemical industry piled up an increase of 53% in its combined net profit for the 9 months period ended on Sept. 30, compared with the same period in 1938.

The results by quarters show continued progress as the year advanced similar to the gains achieved last year. But, while general business has been on the mend in 1939, it was still moving downward in the 1938 period under review, so that the chemical field would seem to justify its standing as a depression-resistant industry.

No War Gains

Likewise, effects of the European war have played a very small part in the results for the third quarter. The gain of 19.2% over the second quarter compares with a corresponding gain of 23.33%. The second quarter of 1939 was 13.14% over the first quarter, compared with a gain of 7.06% between the second and first quarters of 1938.

Constant growth through the discovery of new products, methods and uses and perfection of former practices and inventions is responsible in large part for the ability of the chemical industry to establish its record of rising profits, in the opinion of competent observers.

Fall Exports Soar

September exports of chemicals and related products, valued at $20,000,000, were 39% above last September's $14,300,000, and were 25% above August of this year. Shipments of industrial chemicals more than doubled in value, compared with the like '38 month ($4,152,000 as against $1,940,000); moreover, these were 74% greater than in the month before. Preliminary estimates for October, according to the Dept. of Commerce, indicate a valuation of $19,774,000 for chemical exports, compared with $13,254,000 for October of '38.

Company	9 months 1939	9 months 1938	Year 1938
Air Reduction	$3,524,411	$2,646,622	$3,769,337
Amer. Agric. Chem.	955,964	1,106,089	†285,903
Amer. Cyanamid	3,339,437	1,400,280	2,452,912
Atlas Powder	831,824	745,737	1,013,056
Columbian Carbon	2,380,330	1,944,459	2,757,540
Comm'l Solvents	911,620	[2]218,144	†294,358
Consol. Chem. Ind.	412,108	214,195	117,241
*Dow Chemical	1,449,524	838,703	4,178,485
[1]Du Pont	40,298,244	23,977,355	50,190,827
Freeport Sulphur	1,038,211	1,258,804	1,506,059
Hercules Powder	3,646,561	1,968,635	3,089,017
Interchemical Corp.	1,022,020	272,898	485,383
**Koppers Co.	1,506,549	.....	2,010,316
Mathieson Alkali	624,767	702,961	
Monsanto Chem.	3,514,181	1,853,294	[2]2,914,843
National Oil Prods.	499,289	258,426	401,871
Newport Industries	265,813	[2]35,042	
**Penna. Salt Mfg. Co.	1,354,148	.....	963,055
Texas Gulf Sulphur	5,014,295	5,273,778	6,963,632
Union Carbide & Carbon	19,151,730	13,383,038	25,173,412
United Carbon	1,107,715	1,143,906	1,505,874
United Chemical	116,851	20,526	42,290
Victor Chem. Wks.	735,784	494,794	730,092
Westvaco Chlorine	864,229	562,454	

[1] After deducting income from investment in the General Motors Corporation, aggregating $22,500,000 in the 1939 and $23,977,355 in the 1938 period.

[2] In 2 cases where the company's nine-month total differed slightly from the sum of quarterly figures reported, the latter figure has been utilized in the computations.

[3] Surplus available for common stock after preferred dividends.

† Net loss, 6 months, Dec. 31.

† Net loss.

* Represents 1st quarter earnings only; fiscal year begins June 1.

** Earnings for 12 mos., Sept. 30.

Dividends and Dates

Name	Div.	Stock Record	Payable
Archer-Daniels-Midland	35c	Nov. 20	Dec. 1
Atlas Powder Co.	$1.50	Nov. 30	Dec. 11
Carman & Co., Cl. A (Ac)	$1.00	Nov. 15	Dec. 1
Carman & Co., Cl. A, q.	50c	Nov. 15	Dec. 1
Celluloid Corp., 1st pt. pf.	$3.50	Nov. 17	Dec. 1
Colgate-Palmolive-Peet, pf., q.	$1.50	Dec. 5	Jan. 1
Colgate-Palmolive-Peet, e.	50c	Nov. 21	Dec. 15
Compressed Ind. Gases	25c	Nov. 30	Dec. 15
Diamond Match Co.	25c	Nov. 10	Dec. 1
Diamond Match Co., pt. pf., s.	75c	Feb. 10	Mar. 1
Eastman Kodak, q.	$1.50	Dec. 5	Jan. 1
Eastman Kodak, pf., q	$1.50	Dec. 5	Jan. 1
Freeport Sulphur, q.	25c	Nov. 14	Dec. 1
Freeport Sulphur, e.	50c	Nov. 14	Dec. 1
Mead Corp., $6 pf. A., q.	$1.50	Nov. 15	Dec. 1
Mead Corp., $5.50, pf. B., q.	$1.37½	Nov. 15	Dec. 1
Monsanto Chem., pf. A., s.	$2.25	Nov 10	Dec. 1
Monsanto Chem., pf. B., s.	$2.25	Nov. 10	Dec. 1
Quaker Oats Co., pf., q.	$1.50	Nov. 1	Nov. 29
Sherwin-Williams, pf., q.	$1.25	Nov. 15	Dec. 1
Spencer Kellogg & Sons	40c	Nov. 24	Dec. 11
Std. Wh'le Phosphate & Acid Wks., q.	20c	Dec. 5	Dec. 15
Sylvania Industrial, e.	25c	Nov. 11	Nov. 21
Sylvania Industrial, q.	25c	Nov. 11	Nov. 21
United Chemicals, pf. (N)	$6.00	Nov. 10	Dec. 1
Westvaco Chlorine Prods., e.	60c	Nov. 10	Dec. 1
Westvaco Chlorine Prods., q.	25c	Nov. 10	Dec. 1

(Ac) On accumulations; (e) extra; (N) represents quarterly earnings for the periods ending Sept. 1, '35 to June 1, '37, inclusive—75c for each quarter.

Kodak Declares 1940 Wage Dividend

Directors of Eastman Kodak Co., Rochester, N. Y., early last month declared a 1940 wage dividend for employes, amounting to approximately $2,440,000, payable March 25, next. The distribution is the twenty-eighth since 1912, and brings the total so distributed to around $45,750,000.

Regular Kodak employes who are at work March 25 and who have worked all or part of 26 different weeks in 1939 will be eligible for the wage dividend.

Each employe who has completed five years service at the end of 1939, and who is with the company March 25, will receive a check for more than three times his average weekly wage during the five years from 1935 through 1939. Employes with the company more than six months in 1939 but less than five years will receive payments in proportion to length of service. The number of employes to participate in the 1940 wage dividend is not yet known. The 1939 wage dividend was paid to 28,403 employes including 23,100 in the United States and Canada.

The Month's New Trade Marks

Trade Mark Descriptions†

Continued from p. 622, November

421,332. Jacques Wolf & Co., Clifton, N. J.; July 6, '39; for cationic active softening agent and finish for textile fibres; use since May 1, '39.

421,333. Jacques Wolf & Co., Clifton, N. J.; July 6, '39; for waterproof finish for textile fibres; use since May 1, '39.

421,334. Jacques Wolf & Co., Clifton, N. J.; July 6, '39; for chemical preparation for dyeing and penetration of textile fibres; use since May 5, '39.

421,373-6. The Dow Chemical Co., Midland, Mich.; July 8, '39; for insecticidal compositions; use since June 13, '39.

Nos. 421,389-394. Newport Industries, Inc., Pensacola, Fla.; July 8, '39; for treated rosins.

421,420. Continental Oil Co., Ponca City, Okla.; July 10, '39; for lubricating oil and gasoline; use since June 13, '39.

421,483. Hydroponic Chem. Co., Inc., N. Y. City; July 12, '39; for plant food (hydroponic chemicals); use since June 28, '39.

421,689. California Spray-Chem. Corp., Wilmington, Del., and Richmond, Calif.; July 17, '39; for parasiticides; use since June 8, '39.

421,708. The Magnesol Co., N. Y. City; July 18, '39; for magnesium silicate filter-aids; use since March, '36.

422,053. D. W. Haering & Co., Inc., Chicago, Ill.; July 28, '39; for metal-protecting corrosion preventive preparation; use since July 3, '39.

December

401,940. Monarch Oil Co., Oakland, Calif.; Jan. 15, '38; for lubricating oils and greases; use since 1875.

407,370. Duart Mfg. Co., Ltd., San Francisco, Calif.; June 11, '38; for chemical solution of fluid for use with chemical heating pads for hair waving; use since May 17, '38.

409,560. Albert E. Cloutier (Dresol Chem. Co.), Fall River, Mass.; Aug. 13, '38; for wood floor and linoleum waxes; use since Mar. 1, '37.

410,211. Acme Chem. Co., Milwaukee, Wisc.; Sept. 2, '38; for powdered chemical for treating water, used as a sterilizer, disinfectant and solvent; use since January, '26.

410,679. Blind-X Co., Minneapolis, Minn.; Sept. 17, '38; for cleaner for Venetian blinds, painted surfaces, and the like; use since Aug. 29, '38.

413,919. Turco Products, Inc., Los Angeles, Calif.; Dec. 16, '38; for a general household and industrial cleaning compound; use since Nov. 1, '38.

414,464. The Nu-Met Chemical Corp., N. Y. City; Jan. 3, '39; for metal polish; use since June 1, '38.

418,188. Curex, Inc. (to Lethelin Prods. Co., Inc., Mt. Vernon, N. Y.); Apr. 13, '39; for fungicide controlling growth of "brown patch" on golf greens; use since Mar. 21, '39.

416,087. Worthington Oil Refiners, Inc., Arlington, Va.; Feb. 15, '39; for lubricating oil; use since July 18, '38.

417,007. The Figaro Co., Dallas, Tex.; May 15, '39; for meat curing compounds having incidental flavoring properties; use since Aug. 1, '38.

417,689. Hecker Prods. Corp., N. Y. City; Mar. 31, '39; for shoe polish; use since Feb. 15, '37.

417,794. Ansul Chem. Co., Marinette, Wisc.; Apr. 3, '39; for liquid to be added to refrigerant compounds of the methane series for preventing ice-crystal formation in electric refrigerators; use since Jan. 9, '39.

418,219. The Universal Motor Oils Co., Wichita, Kans.; Apr. 13, '39; for oils, greases and gasoline; use since Dec. 22, '38.

418,337. Chester A. Gordon, Oak Park, Ill.; Apr. 17, '39; for chemical waterproofing agent for ignition systems and electrical equipment; use since Oct. 24, '38.

418,426. Fred Homer Wallace, Frankford, Mo.; Apr. 18, '39; for chemical compound desulfating lead plate storage batteries; use since June 21, '31.

418,640. Huttig Sash & Door Co., St. Louis, Mo.; Apr. 24, '39; for liquid insecticides, particularly for use in termite control; use since Apr. 19, '39.

419,012. Dorsey and Ridley, Oklahoma City and Ada, Okla.; May 3, '39; for liquid dip compound for livestock for destroying grubs, mites, bugs, and lice; use since April, '39.

419,046. Sears, Roebuck and Co., Chicago, Ill.; May 3, '39; for paints in ready-mixed form; use since Feb. 8, '38.

419,137. Anton Sales Co., Phila., Pa.; May 6, '39; for disinfectants; use since 1925.

419,073. Campos y Quebrachales Puerto Sastre S. A., Buenos Aires, Argentina; May 4, '39; for tanning extracts and substances; use since Nov. 10, '33.

419,464. Atlantic Refining Co., Phila., Pa.; May 16, '39; for petroleum, or petroleum-base products used for saturating or impregnating textiles, papers, and the like; use since Feb. 1, '39.

419,492. Allegheny Chem. Corp., Reading and Womelsdorf, Pa.; May 16, '39; for insecticides and fungicides; use since Feb. 11, '39.

419,661. Dryer, Clark & Dryer Oil Co., Oklahoma City, Okla.; May 22, '39; for lubricating oils and greases; use since Jan. 25, '37.

419,709. Brenner's, Inc., Belleville, Ill.; May 23, '39; for liquid cleaning compound; use since May 15, '39.

419,722. Industrial Prods. Co., Phila., Pa.; May 23, '39; for anti-moisture chemical preparation to retard fogging on glass surfaces, and cloths impregnated with same; use since Feb. 28, '39.

419,799. Jacob Finkel (Cleanser Prods. Co.), Phila., Pa.; May 25, '39; for water-soluble cleansing powder; use since Apr. 1, '24.

419,917. Insto Blueprint Ink Co., Salt Lake City, Utah; May 27, '39; for blueprint and drawing inks; use since Apr. 24, '39.

420.086. The Bell Co., Inc. (Flare Labs.), Chicago, Ill.; June 2, '39; for liquid combination automobile body polish and cleaner; use since Feb. 1, '39.

420,169. Carleton Ellis, Montclair, N. J.; June 5, '39; for root or plant growth stimulant compositions; use since Dec. 10, '38.

420,191. Hiram F. Turner (Mirorbrite Chem. Co.), Newport News, Va.; June 5, '39; for cream containing abrasive powder, for polishing silver; use since Feb. 1, '34.

† Trade marks reproduced and described include those appearing in the *U. S. Patent Gazettes*, Sept. 19 to Oct. 14.

The Month's New Trade Marks

420,685

WALLMASTER
420,705

JAP-PAX
420,883

AMPROTEX
420,888

INTESTAL
420,907

TATO
420,908

DISPERSOL
420,917

420,923

CARBONATE OF CALCIUM
421,031

CREOGEN
421,036

DREX-KLEEN
421,067

PERM-A-KLEEN
421,068

DU PONT
421,222; 421,227

421,323

HERMETITE
421,381

LUPEROX
421,383

BOXIL
421,386

POLEOL
421,395

421,427

421,492

Esso
421,543

LUMILAC
421,626

NYSAIR
421,684

LUX

WAX
421,745

421,785

SYNTHENOL
421,806

BRUSHLAST
421,807

PYROFAB
421,830

POLYMEROID
421,836

SAVIN'
SUDS
421,904

421,930

MANCO
421,975

DUR-NATUS
421,993

DUR-SYLVAN
421,994

TROJAN
422,018

KILLOGEN
422,013

NEUTOPLEX
422,026

PENNPAYZ
422,094

FAMOUS
422,124

422,125

(*Trade Mark Descriptions Continued*)

420,235. New England Collapsible Tube Co., New London, Conn.; June 6, '39; for coatings for collapsible tubes and containers; use since May 20, '38.

420,685. The Paintsaver Corp., N. Y. City; June 19, '39; for waterproofing composition; use since April, '39.

420,705. Wall Washing Machines, Inc., Conshohocken, Pa.; June 19, '39; for painted-surface cleaning compound; use since August, '38.

420,883. Morris B. Reade, Inc., Belleville, N. J.; June 24, '39; for insecticide; use since July 1, '38.

420,888. American Aniline Prods., Inc., N. Y. City; June 24, '39; for textile finishes; use since June 16, '39.

422,161. Harry J. Theobald (Industrial Soap Wks.), Kearny, N. J.; July 31, '39; for laundry, textile, and other industrial soaps; use since June, '34.

422,198. Thomas S. Curtis Labs., Huntington Park, Calif.; Aug. 2, '39; for photographic chemicals; use since May 3, '39.

420,907. J. L. Hoffman Co., Allentown, Pa.; June 24, '39; for fowl drinking-water antiseptic; use since Apr. 27, '38.

420,908. J. L. Hoffman Co., Allentown, Pa.; June 24, '39; for disinfectant dip for seed potatoes; use since Mar. '29, '39.

420,917. Shell Oil Co., Inc., St. Louis, Mo.; for insectide oil base; use since Mar. 13, '39.

420,923. Wall Chemicals Corp., Detroit, Mich.; June 24, '39; for acetylene and oxygen gas, and also nitrous oxide, hydrogen, ethylene, and carbon dioxide gas; use since June 18, '32.

421,031. Diamond Alkali Co., Pittsburgh, Pa.; June 28, '39; for paint pigment; use since June 4, '39.

421,036. General Chem. Co., N. Y. City; June 28, '39; for disinfectants for poultry and live stock and quarters therefor; use since May 18, '39.

421,067. Detroit Rex Prods. Co., Detroit, Mich.; June 29, '39; for textile dry-cleaning fluid; use since May 29, '39.

421,068. Detroit Rex Prods. Co., Detroit, Mich.; June 29, '39; for textile dry-cleaning fluid and for metal degreasing solvent; use since May 26, '39.

421,222. E. I. du Pont de Nemours & Co., Wilmington, Del.; June 30, '39; for neoprene, a rubber-like composition of polymerized chloroprene; use since May 12, '31.

421,227. E. I. du Pont de Nemours & Co., Wilmington, Del.; June 30, '39; for dopes and lacquers, dry paint colors, enamel oxides, paint pigments, and the like; use since September, 1920.

421,323. Pyrene Mfg. Co., Newark, N. J.; July 6, '39; for chemical charges for fire extinguishers; use since January, 1932.

421,381. Hermetite Corp., Nutley, N. J.; July 8, '39; for lacquers and lacquers in colors; use since Apr. 1, '23.

421,383. Lucidol Corp., Buffalo, N. Y.; July 8, '39; for organic peroxides and mixtures containing same; use since June 28, '39.

421,386. Medical Chemicals, Inc., Baltimore, Md.; July 8, '39; for germicidal and fungicidal preparations; use since Apr. 2, '39.

421,395. Newport Industries, Inc., Pensacola, Fla.; July 8, '39; for emulsifiable pine oil; use since Feb. 16, '34.

421,427. The F. W. Fitch Co., Des Moines, Ia.; July 10, '39; for liquid for use in stopping runs in hosiery; use since June 30, '39.

421,492. Pinol Mfg. Co., Inc., Phila., Pa.; July 12, '39; for putty; use since January, '22.

421,543. Standard Oil Co. of N. J., Wilmington, Del.; July 13, '39; for matches; use since Nov. 30, '35.

421,626. Titanine, Inc., Union, N. J.; July 15, '39; for ready-mixed aluminum paints, and also ready-mixed paints, varnishes, etc.; use since September, '35.

421,684. West Disinfecting Co., L. I. City, N. Y.; July 17, '39; for deodorizer in cake and crystal form; use since Sept. 27, '22.

421,745. Neverub Corp., Chicago, Ill.; July 19, '39; for floor wax; use since Sept. 9, '35.

421,785. Spic and Span Prods., Saginaw, Mich.; July 20, '39; for cleaning preparation for painted and other finished surfaces; use since June 15, '26.

421,806. Spencer Kellogg and Sons, Inc., Buffalo, N. Y.; July 21, '39; for drying oils for use in paints, varnishes, enamels, and lacquers; use since June 14, '39.

421,807. Estate of H. B. Fred. Kuhls, N. Y. City; July 21, '39; for waterproofing, chemical composition used for filling cracks and seams in metal, wood, canvas, concrete, etc.; use since Jan. 1, '39.

421,830. Wadsworth & Woodman Co., Winthrop, Me., and N. Y. City; July 21, '39; for enameled oilcloth and pyroxylin-coated oilcloth; use since May 29, '39.

421,836. Ault & Wiborg Corp., Cincinnati, O., and N. Y. City; July 22, '39; for ready-mixed paints, varnishes, and paint enamels; use since June 30, '39.

421,904. Sahuara Chem. Co., Downey, Calif.; July 24, '39; for soap and soap preparations; use since June 14, '39.

421,930. Demotex, Inc., L. I. City, N. Y.; July 25, '39; for chemical preparation for treatment of woolens and other textile goods as protection against moths; use since Apr. 3, '39.

421,975. Manning Mfg. Co., Rutland, Vt.; July 26, '39; for lubricating oil and gasoline; use since Nov. 30, '37.

421,993. Brown Co., Portland, Me., and Berlin, N. H.; July 27, '39; for wood pulp; use since July 8, '39.

421,994. Brown Co., Portland, Me., and Berlin, N. H.; July 27, '39; for wood pulp; use since July 6, '39.

422,018. Edwin M. Rosenbluth (Rose Mfg. Co.), Phila., Pa.; July 27, '39; for fungicides and insecticides; use since Sept. 19, '30.

422,019. Edwin M. Rosenbluth (Rose Mfg. Co.), Phila., Pa.; July 27, '39; for fungicides and insecticides; use since Jan. 14, '30.

422,026. Titanine, Inc., Union, N. J.; July 27, '39; for paste and ready-mixed paints, varnishes, enamels, etc.; use since Oct. 23, '36.

422,094. Harold C. Hall (Clayton Oil Co.), Pleasant Ridge, Cincinnati, O.; July 29, '39; for lubricating oils and greases; use since July 22, '39.

422,124. Central Chem. Corp. of Md., Hagerstown, Md.; July 31, '39; for fertilizers; use since May 25, '39.

422,125. Central Chem. Corp. of Md., Hagerstown, Md.; July 31, '39; for fertilizers; use since Mar. 15, '39.

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Reported Consumption of Turpentine and Rosin in United States

(Combined Gum and Wood Products)

	TURPENTINE			ROSIN		
	1938-39	1937-38	1936-37[1]	1938-39	1937-38	1936-37[1]
	(Bbls.—50 gal.)			(Bbls.—500 lbs. gross)		
Abbattoirs	0	0	0	2,173	1,635	4,170
Adhesives and plastics	526	638	628	11,816	17,596	18,002
Asphaltic products	1	0	2	968	1,060	1,723
Automobiles and wagons	354	544	662	328	603	3,541
Chemicals and pharmaceuticals	22,249	31,275	21,583[2]	123,339	119,246	118,404[2]
Ester gum and synthetic resins	9	0	0	108,611	111,812	101,891
Foundries and f'dry supplies	576	759	1,085	7,950	15,227	16,860
Furniture	521	559	592	18	37	31
Insecticides and disinfectants	452	526	471	3,963	4,060	4,194
Linoleum and floor covering	68	67	72	27,313	27,482	34,775
Matches	0	0	0	2,240	2,126	2,966
Oils and greases	37	45	45	23,767	24,498	31,471
Paint, varnish and lacquer	51,292	55,985	61,528	130,278	136,897	140,043
Paper and paper size	0	0	0	318,361	340,200	410,775
Printing ink	489	271	212	11,564	12,763	15,936
Railroads and shipyards	3,872	4,421	5,102	1,365	290	209
Rubber	125	138	168	3,919	2,722	2,926
Shoe polish and shoe mat'ls	10,711	10,726	11,267	10,677	8,176	8,746
Soap	213	9	181	234,927	272,820	297,073
Other industries	1,800	1,636	1,812	4,415	4,397	4,972
Total industries reported	93,295	107,599	105,410	1,027,992	1,103,647	1,218,708
Not accounted for[3]	312,582	335,127	280,458	140,444	88,087	118,790
Apparent U. S. consumption	405,877	442,726	385,868	1,168,436	1,191,734	1,337,498

[1] Compiled from reports by individual consumers for the calendar year 1936; 1937-38 and 1938-39 figures are for the naval stores season. Since industrial consumption is fairly uniform throughout the year in most industries, no material error is involved in using these figures on the naval stores season basis. They will affect only the "Not accounted for."

[2] Includes for the first time turpentine and rosin consumed in producers' plants in the production of unclassified derived products.

[3] Principally unreported distribution of turpentine through retailers who sell in small quantities to ultimate consumers, and of rosin for unreported industrial consumption; also for distribution through retailers who sell in small quantities to ultimate consumers.

Turpentine and Rosin Exports Declining

A relatively high percentage of U. S. annual production is still exported, but the trend of the ratio of exports to production as well as the total volume of exports has been definitely downward, particularly during the last 13 years. During the period 1901-02 to 1913-14 inclusive, the average annual exports were 355,000 bbls. (50 U. S. gals.) of turpentine and 1,384,000 bbls. (500 lbs.) of rosin or approximately 64 per cent. of the total production, whereas the average for each season from 1925-26 to 1937-38 inclusive was 270,000 bbls. (50 U. S. gals.) of turpentine and 1,173,000 bbls. (500 lbs.) of rosin or 49 per cent. of the total production. While the exports of both turpentine and rosin were less during the latter period than they were during the former, the decrease, however, was not the same for each product. For turpentine it amounted to approximately 24 per cent. and for rosin it was 16 per cent.

Factors Influencing World Consumption

There are several causes for this decline in foreign shipments, but perhaps the two most important are world political conditions and a world-wide decrease in the consumption of turpentine by the paint and varnish industry. The former has been more or less responsible for the decrease in the consumption of both rosin and turpentine in certain countries through an enforced substitution of domestically produced materials for the imported products and an increase in the production of Naval Stores in other countries due to some favored nation policy or barter agreement. The very sharp decline in the annual exports of rosin to Germany and Italy which has taken place during the past few years is, therefore, of particular interest since it indicates the effect these conditions have on foreign trade. The average annual volume of rosin shipped to Germany from 1924 to 1933 inclusive was approximately 250,000 bbls. (500 lbs.); from 1934 to 1938 inclusive the average amounted to approximately 160,000 bbls. (500 lbs.), a decrease of 30 per cent. The total rosin shipments to Germany for the season 1937-38 were only 88,143 bbls. (500 lbs.) and this volume is the lowest.

Sulfate Wood Stores A Post-War Industry

While sulfate wood turpentine has been produced in Norway and Sweden for 30 years or more and talloel, (tall-oil) a mixture consisting of approximately 41 per cent. of rosin acids and 59 per cent. of fatty acids, has been made in Sweden for about 25 years, neither product, however, was produced in quantity in the United States prior to 1918. The sulfate wood naval stores division is, therefore, the youngest of the American naval stores family.

Sulfate Wood Turpentine

It appears that reliable data pertaining to the annual production of sulfate wood turpentine during the early period of its manufacture is not available, but it is believed, however, that for several years prior to 1930 the production averaged from 4,000 to 5,000 barrels (50 U. S. gals.). Since 1930, the U. S. Department of Agriculture, Bureau of Chemistry and Soils, have included the production of this product in their annual naval stores report. This data is quoted below.

U. S. Production of Sulfate Wood Turpentine, 1929-30 to 1938-39

Year	Bbls. (50 U. S. gals.)
1929-30	4,000
1930-31	9,957
1931-32	12,248
1932-33	8,000
1933-34	9,000
1934-35	9,832
1935-36	11,712
1936-37	22,635
1937-38	38,500
1938-39	40,467

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EXPORTS, IMPORTS

The statistics on this page were prepared by the Bureau of Foreign and Domestic Commerce, U. S. Dept. of Commerce. Acknowledgments are also due Gamble's International Naval Stores Yearbook for 1937-38.

U. S. Imports of Rosin and Turpentine 1928-29 to 1938-39 Incl.[1]

	Rosin Bbls. (500 lbs.)	Turpentine Bbls. (50 U. S. Gals.)
1928-29	4,122	6,860
1929-30	2,815	6,400
1930-31	906	7,931
1931-32	750	6,440
1932-33	1	9,070
1933-34	3,936	10,007
1934-35	2,526	10,559
1935-36	2,236	12,490
1936-37	2,418	15,929
1937-38	336	14,335
1938-39	49	2,434

[1] As government records of imports of turpentine and rosin do not require any declaration as to whether they are gum or wood products, the available statistics in consequence show only total turpentine and total rosin imports. However, it appears probable that all imports reported above were in fact gum spirits of turpentine and gum rosin.

Exports of Wood and Gum Rosin and Turpentine for Each Year, 1928-29 to 1937-38 Inclusive. Also the Ratio of Total Exports to Total Production.

Total Exports

Year	Rosin (bbls. 500 lbs.)	Per cent. of Production	Turpentine (bbls. 50 U. S. gals.)	Per cent. of Production
1928-29	1,278,813	56	275,926	43
1929-30	1,365,807	54	338,812	47
1930-31	1,219,388	50	327,312	48
1931-32	1,119,635	57	253,907	46
1932-33	1,089,249	59	225,056	44
1933-34	1,199,635	57	300,199	52
1934-35	1,057,369	49	207,285	35
1935-36	1,204,441	53	224,385	37
1936-37	1,099,439	43	271,368	45
1937-38	1,034,522	43	276,530	43

Exports to

Year	Europe Rosin (bbls. 500 lbs.)	Europe Turpentine (bbls. 50 U. S. gals.)	South America Rosin (bbls. 500 lbs.)	South America Turpentine (bbls. 50 U. S. gals.)	Other Countries Rosin (bbls. 500 lbs.)	Other Countries Turpentine (50 U. S. gals.)
1928-29	750,418	211,757	246,717	19,119	286,678	45,050
1929-30	853,992	270,054	226,361	20,166	285,524	48,592
1930-31	711,313	269,894	227,519	14,055	280,556	43,365
1931-32	632,586	201,359	190,866	11,361	296,242	41,187
1932-33	665,689	180,452	180,119	8,094	243,441	36,510
1933-34	727,942	250,435	177,166	8,417	294,527	41,247
1934-35	613,847	158,425	126,329	7,963	317,193	40,897
1935-36	724,977	172,850	168,295	9,139	311,169	42,396
1936-37	627,161	210,243	142,317	10,369	329,960	50,756
1937-38	579,634	208,081	166,321	11,528	288,567	56,921

EXPORTS OF GUM AND WOOD ROSIN, 1936-37-38-39

Destination	GUM ROSIN (Bbls.—599 lbs. net) 1938-39	1937-38	1936-37	WOOD ROSIN (Bbls.—599 lbs. net) 1938-39	1937-38	1936-37	TOTAL ROSIN EXPORTS (Bbls.—599 lbs. net) 1938-39	1937-38	1936-37
United Kingdom	125,844	188,091	166,175	81,876	85,915	77,217	207,720	274,006	243,392
Germany and No. Europe	109,695	183,183	204,223	83,971	96,014	127,045	193,666	279,197	331,268
Italy and So. Europe	29,287	15,900	41,709	10,983	10,438	7,846	40,270	26,338	49,555
Argentine	25,515	50,047	46,467	16,285	17,637	21,634	41,800	67,684	68,101
Brazil	23,069	54,220	35,345	36,577	14,173	7,984	59,646	68,393	43,329
Other South America	18,924	27,947	26,109	13,761	9,857	4,778	32,685	37,804	30,887
Japan	51,027	77,561	107,511	7,597	8,536	17,231	58,624	86,097	124,742
Australia and New Zealand	16,995	26,976	21,341	8,819	3,620	7,919	25,814	30,596	29,260
Netherlands, East Indies	25,355	25,785	34,981	16,783	12,308	18,575	42,138	38,093	53,556
Canada	36,127	49,188	44,013	12,381	17,467	15,122	48,508	66,655	59,135
All Other Exports	37,368	41,475	58,282	33,144	18,134	7,931	70,510	59,609	66,213
Totals	499,206	740,373	786,156	322,177	294,099	313,282	821,381	1,034,522	1,099,439

EXPORTS OF TURPENTINE, 1936-37-38-39

Destination	Gum Turpentine (Bbls.—50 gals.) 1938-39	1937-38	1936-37	Wood Turpentine (Bbls.—50 gals.) 1938-39	1937-38	1936-37	Total Exports of Turpentine (Bbls.—50 gals.) 1938-39	1937-38	1936-37
United Kingdom	92,284	118,106	121,987	12,558	11,062	12,844	104,842	129,168	134,831
Germany and No. Europe	33,990	57,023	52,634	8,244	13,751	7,004	42,234	70,774	59,638
Italy and So. Europe	1,136	900	9,758	2,757	7,077	5,959	3,893	7,977	15,717
Argentine	2,785	4,467	3,368	375	340	375	3,160	4,807	3,743
Brazil	1,903	2,246	2,003	643	398	405	2,546	2,644	2,408
Other So. America	3,433	3,703	3,823	728	735	394	4,161	4,438	4,217
Japan	328	866	671	395	297	454	723	1,163	1,125
Australia and New Zealand	12,043	16,074	15,000	3,988	2,326	2,814	16,031	18,400	17,814
Netherlands East Indies	19	121	18	9	5	4	28	126	22
Canada	21,343	23,068	21,835	2,880	4,064	1,790	24,223	27,132	23,625
All Other Exports	5,645	7,027	6,778	2,740	2,874	1,435	8,385	9,901	8,213
Totals	174,909	233,601	237,875	35,317	42,929	33,478	210,226	276,530	271,368

ETHYL ALCOHOL

PRODUCTION

During the past fiscal year the production of ethyl alcohol amounted to 201,017,546 proof gals., compared with 201,033,858 proof gals. produced in the fiscal year '38 and 223,181,228 gals. produced in the fiscal year '37.

WITHDRAWALS

Withdrawals in the fiscal year '39 exceeded production by 713,952 proof gals., and amounted to 201,731,498 gals., compared with 196,878,568 gals. in the fiscal year '38 and 215,220,823 gals. in the fiscal year '37.

Of the total withdrawals in the fiscal year of '39, 22,150,969 proof gals. were withdrawn upon payment of tax and 179,580,529 gals. were withdrawn tax-free. Tax-paid withdrawals decreased by 6,825,640 gals. from the previous year, and represented 11.0% of total withdrawals, compared with 14.7% of the total in '38. The withdrawals of ethyl alcohol for tax-free purposes in the fiscal year '39, amounting to 179,580,529 gals., represented an increase of 11,678,570 gals. over '38 and a decrease of 3,350,644 gals. from '37. The increase in tax-free withdrawals was largely accounted for by the increased demand for specially denatured alcohol.

Tax-free withdrawals in the fiscal year '39 were for the following purposes: 175,644,641 proof gals. for denaturation, 1,931,695 gals. for hospital and scientific use, 1,057,712 for use of the United States and subdivisions, 198,396 for export, and 748,085 proof gals. for medicinal, beverage, and other authorized uses in Puerto Rico.

NUMBER OF PLANTS

The number of industrial alcohol plants operated was 36 for both the fiscal years '38 and '39. Three new alcohol plants began operations during the past year, one each in Idaho, Virginia, and West Virginia. One plant which had been suspended during '38 resumed operations during '39. Four plants which had operated in '38 did not operate in '39, 2 having suspended operations and the other 2, one of which was an experimental plant, having been discontinued.

The largest producing states in '39 were Pennsylvania, New Jersey, West Virginia, Louisiana, Indiana, and Maryland, in the order stated. The comparative rank of these states in production was the same as in the previous year, except that West Virginia moved from 6th to 3rd place. The production of these 6 states accounted for 86.6% of the total in '39, compared with 87.4% of the total in '38, and 82.5% of the total in '37.

MATERIALS USED

The amount of molasses used in the production of ethyl alcohol decreased from 162,557,843 gals. in '38 to 158,908,347 gals. in '39, and the consumption of corn and other grains decreased from 221,817,260 lbs. to 180,469,145 lbs. The relative production of alcohols from various materials in '39 follows: From molasses, 67.6%; from ethyl sulfate, 23.9%; from grain, 7.7%; and from miscellaneous materials, .08%. While the actual production from molasses and grain was smaller, the production from ethyl sulfate and miscellaneous materials was greater, in '39 than in '38.

NOTE

Data are in proof gallons containing 50 per cent. alcohol by volume. The tax on alcohol is collected on the basis of proof gallons. A standard proof gallon is a gallon of spirits "which contains one-half its volume of alcohol of a specific gravity of seven thousand nine hundred and thirty-nine ten-thousands. (.7939) at sixty degrees Fahrenheit." (See Sec. 2809, Internal Revenue Code 1939.)

Ethyl Alcohol: Summary of Operations of Plants and Bonded Warehouses and Materials Used, Fiscal Years '38 and '39

		1939	1938	Increase (+) or decrease (—)
Number of plants operated[1]		36	36	—
Number of bonded warehouses operated		63	68	—5
Operations (Proof gallons[2])				
Production		201,017,546	201,033,858	— 16,312
Removed to bonded warehouses		200,055,093	200,343,151	— 288,058
Withdrawals from bond, total[3]		201,731,498	196,878,568	+ 4,852,930
Tax-paid		22,150,969	28,976,609	— 6,825,640
Tax-free, total		179,580,529	167,901,959	+ 11,678,570
For denaturation[3]		175,644,641	164,263,210	+ 11,381,431
For hospital and scientific use		1,931,695	1,849,899	+ 81,796
For use of U. S. and subdivisions		1,057,712	950,760	+ 106,952
For export		198,396	167,534	+ 30,862
For medicinal, beverage and other authorized uses in Puerto Rico		748,085	670,556	+ 77,529
Losses in warehouses		496,086	524,879	— 28,793
Losses in transit		38,188	41,048	— 2,860
Stocks in bonded warehouses June 30[4]		30,860,351	32,046,632	— 1,186,281
Materials used				
Molasses	(Gallons)	158,908,347	162,557,843	— 3,649,496
Grain:				
Corn	(Pounds)	156,650,225	189,235,346	— 32,585,121
Malt	"	21,131,972	26,832,102	— 5,700,130
Rye	"	2,398,507	5,386,117	— 2,987,610
Other	"	157,836	363,695[5]	— 205,859
Ethyl sulfate	(Gallons)	35,388,995	26,577,150	+ 8,811,845
Sulfite liquor	"	24,949,950	—	+ 24,949,950
Pineapple juice	"	1,593,687	2,007,339	— 413,652
Crude alcohols mixture	"	1,227,112	—	+ 1,227,112
Potatoes	(Pounds)	743,411	—	+ 743,411
Manioca meal	"	—	156,296	— 156,296
Cellulose pulp and chemical mixtures	"	149,024	—	+ 149,024
Miscellaneous	"	130,605	16,350	+ 114,255

[1] Includes 2 experimental plants in 1938 and 1 in 1939.
[2] A proof gallon contains 50% alcohol by volume.
[3] Includes 666,271 proof gallons in 1938 and 806,927 proof gallons in 1939 transferred to denaturing plants by alcohol plants not having bonded warehouses.
[4] Stocks in transit between bonded warehouses and quantities in receiving tanks of alcohol plants awaiting transfer to bonded warehouses not computed.
[5] Includes 17,114 pounds of diamalt.

Data for the fiscal year 1939 will be completed in the January issue, including S. D. statistics for the fiscal year 1938.

Ethyl Alcohol: Production, By Kinds of Materials Used, Fiscal Year '39

Kind of material	Quantity used: Amount	Unit	Alcohol produced: Proof gallons	Per cent. of total
Molasses[1]	157,725,222	Gallons	135,834,286	67.57
Ethyl sulfate	35,388,995	"	47,963,514	23.86
Grain[1]	180,446,598[2]	Pounds	15,539,967	7.73
Crude alcohols mixture	1,227,112	Gallons	310,141	.15
Pineapple juice	1,593,687	"	151,394	.08
Mixtures:				
Sulfite liquor	24,949,950	"		
Molasses	1,183,125	"		
Potatoes	743,411	Pounds	1,218,244[3]	.61
Cellulose pulp and chemical mixtures	149,024	"		
Barley	22,363	"		
Malt	184	"		
Total			201,017,546	100.00

[1] Additional amounts used in combination with other materials included under "Mixtures."
[2] Include 130,605 pounds of a corn sugar by-product.
[3] Includes 71,820 proof gallons produced at an experimental plant from materials not shown.

Alcohol

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DENATURED ALCOHOL*

Production

The production of denatured alcohol amounted to 100,740,510 wine gals. in the fiscal year '39, as compared with 94,607,741 wine gals. produced in '38 and 102,202,659 in '37.

Withdrawals

Withdrawals in '39 amounted to 99,872,629 wine gals., as compared with 94,981,204 wine gals. taken in '38 and 103,165,980 in '37. 1939 withdrawals consisted of 82,668,014 wine gals. of specially denatured alcohol and 17,204,615 gals. of completely denatured alcohol, the former representing an increase of 13,414,756 gals., and the latter a decrease of 8,523,331 gals. —compared with '38. Withdrawals of S. D. were the greatest of any year of record, and constituted 82.8% of the total withdrawals of denatured alcohol in '39, as compared with 72.9% in '38 and 77.2% in '37.

Use of Denatured Increased

The number of denaturing plants operated decreased from 43 in '38 to 38 in the fiscal year '39. The number of manufacturers using S. D. alcohol increased from 4,321 in '38 to 4,405 in '39, and the amount of denatured alcohol used (including that recovered and reused) increased from 127,456,902 wine gals. in '38 to 142,969,775 gals. in '39.

* Data in wine gals. of approximately 190 proof.

Denatured Alcohol: Production, by Months, Fiscal Year '39

(Wine gallons)

Month	Completely denatured	Specially denatured	Total
July	1,303,340	5,407,077	6,710,417
Aug.	1,502,076	6,343,617	7,845,693
Sept.	2,602,376	6,555,095	9,157,471
Oct.	3,723,507	7,375,919	11,099,426
Nov.	2,826,942	7,359,401	10,186,343
Dec.	2,105,460	8,372,981	10,478,441
Jan.	474,140	6,352,405	6,826,545
Feb.	339,343	6,106,587	6,445,930
Mar.	504,865	7,110,718	7,615,583
April	240,918	7,477,594	7,718,512
May	695,327	7,794,973	8,490,300
June	861,139	7,304,710	8,165,849
Total	17,179,433	83,561,077	100,740,510

S. D. Alcohol: Summary of Withdrawals, by Leading[1] Formulae, Fiscal Year

Formula	Total
1	22,891,605
2-B	17,943,677
29	15,987,437
18	6,725,404
35-A	3,861,047
40	2,496,767
23-G	2,231,780
4	1,703,355
23-A	1,518,102
17	1,054,947
23-H	1,025,316
3-A	976,801
13-A	608,155
37	582,181
39-C	556,671
28-A	457,478
38-B	428,420
32	268,241
12-A	255,707
30	234,387
39-B	196,243
28	192,985
All others	471,308
Total	82,668,014

[1] Withdrawals exceeding 100,000 gals. ranked in order of total withdrawals.

Denatured alcohol[1]: Summary of operations of denaturing plants, bonded dealers in, and bonded manufacturers using specially denatured alcohol, fiscal years 1938 and 1939

Denaturing plants	1939	1938	Increase (+) or decrease (—)
	(Quantities in wine gallons[2])		
Number operated[3]	38	43	—5
Production, total	100,740,510	94,607,741	+ 6,132,769
Completely denatured	17,179,433	25,598,717	— 8,419,284
Specially denatured	83,561,077	69,009,024	+ 14,552,053
Withdrawals, total	99,872,629	94,981,204	+ 4,891,425
Completely denatured	17,204,615	25,727,946	— 8,523,331
Specially denatured	82,668,014	69,253,258	+ 13,414,756
Losses, total	100,071	101,569	— 1,498
Stocks June 30, total	1,981,559	1,191,624	+ 789,935
Completely denatured	655,996	699,772	— 43,776
Specially denatured	1,325,563	491,852	+ 833,711
Bonded dealers			
Number operating	55	64	—9
Received[4]	3,243,249	3,019,005	+ 224,244
Removed[4]	3,143,007	3,081,681	+ 61,326
Losses in storeroom	1,937	1,944	— 7
Stocks June 30	378,009	283,206	+ 94,803
Bonded Manufacturers			
Number operating	4,405	4,321	+ 84
Received	82,417,391	69,959,309	+ 12,458,082
Recovered after use	61,248,937	57,198,813	+ 4,050,124
Total used[5]	142,969,775	127,456,902	+ 15,512,873
Losses	62,761	87,182	— 24,421
Stocks June 30	3,162,641	2,708,739	+ 453,902

[1] Including denatured rum.
[2] In wine gallons of approximately 190 proof.
[3] Includes 2 denaturing plants operated in conjunction with experimental alcohol plants in 1938 and 1 in 1939.
[4] Excluding inter-dealer shipments.
[5] Including amount recovered and reused.

For comparison with earlier periods please refer to Statistical and Technical Data Section, pp. 693-696, December 1938 (Alcohol, Fiscal Year 1938); also, Statistical and Technical Data Section, pp. 117-118, January 1938 (Alcohol, Fiscal Year 1937).

C. D. Alcohol: Withdrawals, by Formulae and by Months, Fiscal Year '39

Month	Formula[1] 14	13	12	11	10	Total
July	589,353	590,907	23,890	17,730	110	1,221,990
August	890,582	445,810	52,676	74,946	110	1,464,124
September	1,324,768	930,108	209,377	88,525	224	2,553,002
October	2,343,268	1,228,734	177,730	234,381	542	3,984,655
November	1,487,525	1,171,334	232,187	96,414	1,816	2,989,276
December	1,167,309	736,803	174,466	30,511	579	2,109,668
January	81,662	299,295	63,133	369	325	444,784
February	141,586	193,019	25,841	509	355	361,310
March	227,500	210,684	41,898	283	19	480,384
April	29,656	137,820	16,392	226	220	184,314
May	531,139	50,328	15,409	333	450	597,659
June	750,394	56,987	5,840	227	1	813,449
Total	9,564,742	6,051,829	1,038,839	544,454	4,751	17,204,615

[1] Information as to the composition of these formulae will be found in Treasury Decisions Nos. 10 and 4648 and the appendix to Regulations No. 3, Formula for Completely and Specially Denatured Alcohol, Revised 1938, Treasury Department, Bureau of Internal Revenue.

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A Complete Check-List of Products, Chemicals, Process Industries

Agricultural Chemicals

Process converting peat into a material suitable for the feeding and bedding of animals. No. 2.178,051. Edward Henry Sams, Isleworth, England.

Cellulose

Process making cellulose, comprising digesting cellulosic raw material with cooking acid of high SO_2 content. No. 21,251. Reissue. Torsten E. Waenerlund, Domsjo, Ornskoldsvik, Sweden, to Mooch Domsjo Aktiebolag Ornskoldsvik, Sweden.

Production mixed cellulose esters, comprising essentially esterification in a solvent substantially inert to the esterifying agent, in the presence of catalytic amounts of carbonates, phosphates, acetates, butyrates, or borates of the alkali and alkaline earth metals. No. 2,175 357. Robert W. Maxwell, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture highly acetylated cellulose, first treating the cellulose with acetic acid, then with a mixture of acetic anhydride, acetic acid, a "non-solvent," and a catalytic amount of perchloric acid. No. 2,175,842. Pierre Koetschet, Lausanne, Switzerland, to Société des Usines Chimiques Rhone-Poulenc, Paris, France.

Manufacture of lower fatty acid esters of cellulose, wherein the cellulose is acylated partially hydrolyzed, precipitated out, washed with water of substantially uniform hardness, and dried. No. 2,177,667. Carl J. Malm, to Eastman Kodak Co., both of Rochester, N. Y.

Preparation stable cellulose esters of organic esters. No. 2,177,903. Herbert E. Martin, Cumberland, Md., to Celanese Corp. of America, a corp. of Delaware.

Purification of water-insoluble cellulose ethers, comprising treating the solid ethers with aqueous lower fatty acid containing 0.05-0.50% of the acid, for a time sufficient to separate out in water-soluble form the contaminating metal constituents in the ethers. No. 2,178,630. Alexander S. Finlayson to Hercules Powder Co., both of Wilmington, Del.

Manufacture cellulose solutions, comprising solution in a liquid mixture of oxides of tertiary amines. No. 2,179,181. Charles Graenacher, Basel, and Richard Sallman, Arlesheim, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Cellulose article, comprising regenerated cellulose containing a derivative of a furan compound. No. 2,179,449. Johann Eggert, Berlin, and Walter Gellendien, Berlin-Charlottenburg Germany, to Deutsche Hydrierwerke Aktiengesellschaft, Berlin-Charlottenburg, Germany.

Manufacture of salts of cellulose ether carboxylic acids. No. 2,179,457. Julius Voss, Wiesbaden-Biebrich, Germany, to Kalle & Co., Aktiengesellschaft, Wiesbaden-Biebrich, Germany.

Method precipitating cellulose triacetate from solution by running the reaction mixture into 40-60% aqueous acetic acid. No. 2,180,009. Carl J. Malm, to Eastman Kodak Co., both of Rochester, N. Y.

Chemical Specialty

Friction unit comprising asbestos fibre, litharge, albumen, and added friction materials. No. 2.175,480. William Nanfeldt, Clifton, N. J., to World Bestos Corp., Paterson, N. J.

Mineral oil of lubricating viscosity containing a small amount of an agent, diphenyl carbazide or diphenyl semicarbazide. No. 2,175,548. John M. Musselman and Herman P. Lankelma, to The Standard Oil Co., all of Cleveland, Ohio.

Demulsifying agent for crude oil, being monoglycerylricinoleate. No. 2,175,699. Max Powell, San Gabriel, Calif.

Smoke screen material, comprising a volatile chloride of the class: $TiCl_4$ and $SnCl_4$ in chemical combination with a sulfur chloride and a substantial excess of one of said chlorides. No. 2,175,790. James F. Booker, Nutley, and Roger L. Annis, Newark, N. J., to Intermetal Corp., Newark, N. J.

Cementing composition, comprising an aqueous emulsion containing adhesive, thermoplastic material, a soap therefore, and clay, together with dispersed rubber; said adhesive material an asphalt preparation. No. 2,175,797. Edwin O. Groskopf, Rutherford, N. J., to The Patent and Licensing Corp., New York City.

Culinary salt composition, comprising 5% $NaHCO_3$, 7% anhydrous Na_3PO_4, 10% anhydrous Na_2SO_4, and 78% NaCl; said composition preserving the natural color and lessening shrinkage when cooking food substances whose hydrolysis can be accelerated by use of the said composition. No. 2,175,955. Frederick Craig Ewan Harry, Maroubra, near Sydney, New South Wales, and Henry Herbert, York, Killara, near Sydney, New South Wales, Australia, to Chemex Limited, Alexandria, near Sydney, New South Wales, Australia.

Stabilized bactericide, comprising slightly alkaline solution of a mercuriated phenol derivative, and a colloid of the group consisting of gelatin, acacia, egg albumin, pectin, casein, lysalbinic acid, and protalbinic acid. No. 2,176,890. Walter G. Christiansen, Glen Ridge, N. J., to E. R. Squibb & Sons, New York City.

Stable mothproofing solution, comprising in solution triethanolamine silicofluoride, aluminum sulfate, and a soluble wetting agent, said solution being substantially free of silicic acid. No. 2,176,894. William H. Engels and John Weijlard, to Merck & Co., Inc., all of Rahway, N. J.

Dielectric composition, comprising insulating material impregnated with a mineral oil containing 1-5% of a diphenyl, or dibenzyl sulfide, or a diphenyl ketone or ether. No. 2,176,952. Leo J. Berberich, Pittsburgh, Pa., to Socony-Vacuum Oil Co., Inc., New York City.

Paint and varnish remover, comprising a solution of acetyl chloride in methyl ethyl ketone. No. 2,176,995. Gilbert F. Hoffmann, Milwaukee, Wis., to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Fungicide, comprising essentially phenothiazine. No. 2,177,198. Marion C. Goldsworthy, Takoma Park, Md.; dedicated to the free use of the People in the territory of the United States.

Wax-in-water emulsion stabilized with a morpholine compound with a higher fatty acid. No. 2,177,240. Homer Clark Brumbaugh, Baltimore, Md., to Universal Chemical Corp., Akron, Ohio.

Insecticidal emulsion, comprising plant spray mineral oil and sufficient of a mixture of petroleum sulfonate and bleachable cottonseed oil. No. 2,177,434. Paul R. Jones, Piedmont, Calif., to Shell Development Co., San Francisco, Calif.

Wood preservative composition, comprising a solution of coal tar in a petroleum oil fraction which will not reduce the fungicidal strength of the former, and has an aniline point below about 50° F. No. 2,177,448. Howard B. Carpenter, Elizabeth, N. J., to Penola, Inc.

Meat preservative, comprising incorporating with comminuted meat an alkali metal aluminate, changing the pH of the meat to about 7.0-7.4. No. 2,177,519. James J. Doyle, Chicago, Ill.

Rodenticide, acting as a stomach poison, comprising a poison supported by a carrier from the group consisting of water-soluble methyl cellulose and hydroxy-ethyl cellulose. No. 2,177,598. Paul Herzig and Hans Kukenthal, Leverkusen I. G. Werk, Germany, to Winthrop Chemical Co., Inc., New York City.

Improved Diesel fuel, comprising a hydrocarbon fuel oil, which has dissolved therein a minor proportion of bis-(diamylamine)disulfide. No. 2,177,719. William H. James. Paulsboro, Robert C. Moran, Wenonah, and Edwin M. Nygaard, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Method etching an engraving metal plate, using a nitric acid containing a small amount of urea. No. 2,177,751. Edward A. Sikorski, Parma, Ohio, to General Chemical Co., New York City.

Improved mineral oil composition, comprising a hydrocarbon oil containing a minor proportion of a completely substituted phenol of the benzene, naphthalene, or anthracene series having a derivative comprising an alkylated phosphorous acid compound of a carbonyl chloride of an aromatic compound. No. 2,177,923. Henry G. Berger, Woodbury, and William H. James, Wenonah, and Darwin E. Badertscher, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Abrasive article, comprising abrasive grains united by a rubber bond containing aniline-formaldehyde resin. No. 2,177,940. Samuel S. Kistler, West Boylston, Mass., to Norton Co., Worcester, Mass.

Froth flotation synthetic assistant, comprising an ionizable organic compound of heterocyclic-aliphatic structure of high molecular weight. No. 2,177,985. Benjamin R. Harris, Chicago, Ill.

As a new product, blown drying oil (non-conjugated type) having a conjugated system—insol. in ethanol, sol. in petroleum solvents, and liquid at 25° C. No. 2,178,604. Izador J. Novak, to Raybestos-Manhattan, Inc., both of Bridgeport, Conn.

Lubricant, comprising a lubricating oil containing an ester of a phosphorus acid containing at least 1 naphthenyl radical. No. 2,178,610. Paul Lawrence Salzberg, Carrcroft, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Expander for addition to storage battery plate pastes, being a nickel salt of sulfonated lignin. No. 2,178,680. Robert A. Daily, Muncie, Ind., to General Motors Corp., Detroit, Mich.

Cleaning fluid for glass lamina to be used for laminated glass fabrication, comprising dichloroethyl ether containing a chloride of the group containing iron, manganese, zinc, calcium, and sodium. No. 2,179,004. Frederic L. Bishop, Jr., Jeannette, Pa., to American Window Glass Co., Pittsburgh, Pa.

Contact filtration medium, comprising a major proportion of finely divided pyrophyllite mixed with 5-50% of fibrous talc. No. 2,179,028. William H. Alton, Westport, Conn., to R. T. Vanderbilt Co., Inc., New York City.

Lithographic plate, comprising a water-soluble reaction product of a halogen and polyvinyl alcohol. No. 2,179,245. William H. Wood, Bedford, Ohio, to Harris-Seybold-Potter Co., Cleveland, Ohio.

Metal soldering composition, comprising 1-3% Na_2F_2, 12-25% NH_4Cl, and 74-87% $ZnCl_2$. No. 2,179,258. John Frederick Howarth, Long Beach, N. Y., one-half to Albert I. Elias, New York County, N. Y.

Pressure-sensitive, non-hardening adhesive composition, comprising a tacky mixture of liquid hydrogenated abietic acid derivative and a lesser proportion of a resin. No. 2,179,339. Julius G. Little, to Hercules Powder Co., both of Wilmington, Del.

Abrasive coated article, comprising a backing and abrasive grains attached thereto by a heat-hardened bond consisting of the reaction product of lignin, a phenol, and an aldehyde, containing not more than 40% lignin. No. 2,179,487. Raymond C. Benner and Norman P. Robie, Niagara Falls, N. Y., to The Carborundum Co., Niagara Falls, N. Y.

Water-resistant cigarette paper, comprising a discontinuous coating of wax and mineral oil, said wax having a M. P. of about 60° C. No. 2,179,953. Earle C. Pitman, Lincroft, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Composition of matter, comprising a polyvinyl halide and a silicate of the class: calcium, barium, strontium, lead, and silver. No. 2,179,973. Claude H. Alexander, Cuyahoga Falls, Ohio, to The B. F. Goodrich Co., New York City.

Petroleum lubricating oil, containing a halogenated resorcinol. No. 2,180,008. Bert H. Lincoln and Waldo L. Steiner, Ponca City, Okla., and Alfred Henriksen, deceased, late of Ponca City, Okla., by Ellen M. Henriksen, administratrix, Ponca City, Okla., to The Lubri-Zol Development Corp., Cleveland, Ohio.

Composition of matter suitable for sealing plant wounds, comprising a higher polymer of an iso-olefin. No. 2,180,081. Martin Mueller-Cunradi, Michael Otto, Walter Daniel, and Robert Werner, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Gelatinous adhesive for wallpaper purposes, comprising a viscous, colloidal solution of from 3-8% of a water-soluble salt of an ether of cellulose with a lower carboxylic acid, said mass not requiring further treatment after application to promote adhesion. No. 2,180,152. Rudolf Kohler, Dusseldorf, Germany, to Henkel & Cie., G.m.b.H., Dusseldorf-Holthausen, Germany.

Composition of matter, a cellulose ester containing, as plasticizer, a mono N-cyclohexyl aromatic sulfonamide of the benzene series. No. 2,180,281. Lucas P. Kyrides, Webster Groves, Mo., to Monsanto Chemical Co., St. Louis, Mo.

Coal Tar Chemicals

Process refining benzol crudes by fractional distillation. No. 2,175,619. Gerhard Ruhl, Recklinghausen, Germany, to Koppers Company, Pittsburgh, Pa.

Process manufacturing alkyl hydroxy aromatic compounds, comprising essentially reacting chlorinated petroleum distillates with an aromatic hydrocarbon having a nuclear hydroxy group. No. 2,178,571. Lawrence H. Flett, Hamburg, N. Y., to National Aniline & Chemical Co., Inc., New York City.

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Conversion tertiary arylamine having a free para position and with its N atom bearing hydrocarbon radical of at least 3 carbon atoms and another having at least 1 carbon atom, comprising treating in acid medium with 4 times the equivalent of nitrous acid, to yield the paradiazonium salt thereof. No. 2,178,585. Walker M. Hinman, Winnetka, and Walter G. Hollmann, Chicago, Ill.

Manufacture a vitreous-fracture solid polychlorophenol soluble in fuel-oil-boiling-type petroleum hydrocarbons, said polychlorophenol normally tending to bloom when applied to wood as a solution. No. 2,180,142. Kent R. Fox and Edmund C. Hyry, St. Louis, and Ira Hatfield, Webster Groves, Mo., to Monsanto Chemical Co., St. Louis, Mo.

Coatings

Manufacture a dry-castable film-forming solution, comprising one of the normally solid primary alkylamines of high molecular weight and salts thereof, said solid being present in amount sufficient to improve the film's stripping properties. No. 2,176,903. Emmette F. Izard, Kenmore, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Dry calcimine composition, comprising powdered gypsum, water-soluble adhesive, and only sufficient of alkaline-reacting material to neutralize the composition. No. 2,177,154. Herman A. Scholz, Oak Park, and Alexander Adams, Chicago, Ill., to United States Gypsum Co., Chicago, Ill.

Method chrome plating metal articles. No. 2,177,392. John Rice Mardick, New York City.

Manufacture a non-leafing bronze powder coating composition, comprising grinding bronze powder in a highly volatile solvent until powder is reduced to extreme fineness, and then mixing with a synthetic resin varnish to a uniform dispersion. No. 2,178,018. Joseph Francis Hofmann, to Acme White Lead & Color Works, both of Detroit, Mich.

Preparation mineral oil for use in paints, comprising adding thereto a solution of an alkali metal silicate and an alkali metal fluosilicate, mixing and heating, and then adding an alum. No. 2,178,705. Allan B. Ruddle, San Francisco, Calif.

Dry coating compound comprising a dry, pulverulent pitch tending to coalesce in storage, and a finely divided aggregate mixed therewith to retard said coalescent action. No. 2,178,770. William Zaisser, Woodside, N. Y., one-half to Harry S. Walker, New York City.

Method forming a protective coating on magnesium, comprising treating with a solution in water of alkali metal dichromate and a salt of the group including zinc and cadmium sulfates. No. 2,178,977. Martin Tosterud, Arnold, Pa., to Magnesium Development Corp., a corp of Delaware.

Flat liquid coating composition containing an aerogel in substantially its natural form. No. 2,180,145. Charles Gordon Harford, Wollaston, Mass., to Monsanto Chemical Co., St. Louis, Mo.

Dyes, Stains, Etc.

Manufacture an amido-aniline type azo dyestuff. No. 2,175,370. Frithjof Zwilgmeyer, Arden, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation a meta-halo-para-ethoxy-acetoacetanilide dyestuff. No. 2,175,371. Frithjof Zwilgmeyer, Arden, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture copper complexes of polyazo dyestuffs of the stilbene series. No. 2,175,552. Hans Schindhelm, Frankfort-on-the-Main-Fechenheim, and Carl Theo Schultis, Bergen, near Frankfort-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Manufacture chromable dyestuffs of the triarylmethane azo series. No. 2,175,716. Wilhelm Eckert and Karl Schilling, Frankfort-on-the-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Manufacture leather azo dyestuffs, naphthalene derivatives, being dark powders yielding violet to blue to black shades on leather. No. 2,175,794. Erich Fischer and Walter Gmelin, Bad Soden in Taunus, and Richard Huss, Frankfort-on-the-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Manufacture water-soluble monoazo dyestuffs of the naphthalene series, being acid wool dyes yielding even yellow-brown, brown-red to Bordeaux shades. No. 2,175,795. Erich Fischer and Walter Gmelin, Bad Soden-in-Taunus, Germany, to General Aniline Works, Inc., New York City.

Manufacture water-soluble azo acid wool dyestuffs of the naphthalene series, yielding orange-yellow, red to blue-red shades. No. 2,175,796. Erich Fischer and Walter Gmelin, Bad Soden in Taunus, Germany, to General Aniline Works, Inc., New York City.

Preparation complex vat dyestuffs of the anthraquinone series. No. 2,175,803. Ernst Honold and Max Schubert, Frankfort-on-the-Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.

Production water-insoluble dyestuffs on the fiber by the ice-color method. No. 2,175,806. Karl Jellinek, Offenbach-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Preparation solid aromatic diazonium compounds, being generally green, crystalline substances of good stability and solubility. No. 2,175,807. Ferdinand Keller, Offenbach-on-the-Main, Burgel, Germany, to General Aniline Works, Inc., New York City.

Manufacture copper complex compounds of disazo dyestuffs of the stilbene series. No. 2,175,815. Hans Schindhelm, Frankfort-on-the-Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.

Production dyestuffs of the diphenylmethane series, comprising a dinitrobenzene monosulfonic acid linked through an amine group to a fully substituted phenylene amine. No. 2,177,113. Hans Krzikalla and Heinz Pardon, Ludwigshafen-on-the-Rhine, and Fritz Hess, Frankfort-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Preparation a dyestuff of the disazo type, comprising 4-amino-4′-nitrodiphenylamine-2′-sulfonic acid coupled with a meta diamine of the benzene series, which is itself linked to an amino-salicylic acid derivative. No. 2,177,371. Mordecai Mendoza, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., of Great Britain.

Preparation azo dyestuffs of the type: $R_1{-}N = N{-}C_6H_2(x)(y){-}NH{-}R_2$, R_1 standing for an aromatic isocyclic 6-membered ring, R_2 for a sulfonated aromatic isocyclic 6-membered ring, and x and y for organic substituents of non-ionogenic nature; said dyestuffs yielding on wool, silk, and acetate silk, yellow, red, violet, brown, and blue tints. No. 2,177,427. Friedrich Felix, Basel, and Rudolf von Capeller, Riehen, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Preparation an azo dyestuff, comprising coupling alpha-naphthol with 1-hydroxy-2-amino-4-(methyl or nitro)-benzene sulfonic acid. No. 2,178,054. Fritz Straub and Willi Widmer, Basel, Switzerland, to Society of Chemical Industries in Basle, Basel, Switzerland.

Process for coloring mixed textile materials with azo dyestuffs. No. 2,178,744. George Holland Ellis and Charles Finley Topham, Spondon, near Derby, England, to Celanese Corp. of America, a corp. of Delaware.

Preparation a polyazo diphenyl derivative containing other organic nuclei of conjugated structure. No. 2,178,757. Henry Jordan and Swanie S. Rossander, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Preparation a soluble sulfonic acid of a naphthopheno-safranine dyestuff, soluble in at least aqueous sodium acetate. No. 2,178,793. Eugen Huber, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Preparation an anthraquinone acid wool dyestuff, comprising a derivative 1-amino-2-sulfonic-4-aryliminobenzene-5- or 6-aryloxy (or alkoxy) anthraquinone. No. 2,179,217. David X. Klein, Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture a dyestuff of the anthraquinone series, wherein one of the quinone nuclei is disubstituted in the 1,4 positions by a radical of the group consisting of amino, arylsulfonylimino, and aroylimino compounds. No. 2,179,551. Donald P. Graham, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation an amido-anthraquinone dyestuff having aroylamino radicals of the benzene series as substituents in the 1,4 positions. No. 2,179,552. Donald P. Graham, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Process coloring fruits with an oil-soluble dye dissolved in a water-immiscible solvent of the class: $CHCl_3$, CCl_4, dichlorethane, tri-, tetra- and pentachlorethanes, di-, tri- and tetrachlorethylenes, and dichlorobenzene together with a water-miscible solvent of the organic hydroxy type. No. 2,179,762. Longfield Longfield-Smith, Babson Park, Fla., to Mrs. B. C. Skinner, Dunedin, Fla.

Process reducing aromatic nitrates with iron, to the corresponding amines, with subsequent recovery of the metallic sludge. No. 2,179,919. Dugald M. Carr, Gibbstown, and William S. Pilcher, Wenonah, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation a polystyrene solution for coating purposes, comprising polystyrene contained in a solvent mixture of aromatic hydrocarbon or chlorinated hydrocarbon and 1-5% of dioxan. No. 2,179,975. Edgar C. Britton, Midland, Mich., Harry Borden Marshall, Toronto, Ontario, Canada, and Clyde W. Davis, Midland, Mich., to The Dow Chemical Co., Midland, Mich.

Preparation a complex dye base, having as a nucleus a 5-or 6-membered heterocyclic ring, in which the nuclear atoms include non-metallic atoms. No. 2,179,990. Bernard Beilenson, Harrow, England, to Eastman Kodak Co., Rochester, N. Y.

Process coloring a cellulose organic derivative with an azo dye, the last being a meta,meta-nitro,alkoxy-azobenzene derivative. No. 2,180,012. James G. McNally and Joseph B. Dickey, to Eastman Kodak Co., all of Rochester, N. Y.

Production rubber-like polymers, by condensing a butadiene in the presence of solid, highly polymerized isobutylene. No. 2,180,082. Martin Mueller-Cunradi and Walter Daniel, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Production rubberlike polymers by condensing vinyl carbazole in the presence of solid, highly-polymerized isobutylene. No. 2,180,083. Martin Mueller-Cunradi and Walter Daniel, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation of beta-halogen-butadienes-1,3; method comprising stripping the required hydrogen halide by heating the corresponding 1,2-dihalogen-butene. No. 2,180,115. Heinrich Lange and Otto Horn, Frankfort-on-the-Main-Hochst, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture substantive polyazo dyestuffs of the naphthalene series. No. 2,180,245. Adolf Krebser, Riehen, near Basel, Switzerland, to J. R. Geigy A. G., Basel, Switzerland.

Manufacture disazo dyestuffs of the naphthalene series, yielding violet shades of good fastness, from an acid bath on animal fibres. No. 2,180,246. Adolf Krebser, Riehen, near Basel, Switzerland, to J. R. Geigy A. G., Basel, Switzerland.

Water-insoluble azo dyestuffs of the aromatic series, yielding orange to blue and brown dyeings of good fastness to light. No. 2,180,297. Leopold Laska, Offenbach-on-the-Main, Arthur Zitscher, Kronberg in Taunus, and Rudolf Heil, Offenbach-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Explosives

Ammunition priming mixture, containing a dry mixture of a nitrate of lead or calcium with a hypophosphite of the group consisting of potassium, sodium, calcium, strontium, ammonia, barium and manganese. No. 2,175,826. Willi Brun, Bridgeport, Conn., to Remington Arms Co., Inc., a corp. of Delaware.

Explosive, comprising a nitroresorcinol salt. No. 2,177,657. Edward B. W. Kerone and Clayton C. Carroll, Alton, Ill., to Western Cartridge Co., East Alton, Ill.

Smokeless powder grains, being coated with a lower alkyl ester of o-benzoyl-benzoic acid melting within 35-110° C. No. 2,179,312. Elton R. Allison, Kenvil, N. J., to Hercules Powder Co., Wilmington, Del.

Smokeless powder grains, being coated with an aryl ester of benzoic or a lower fatty acid, said ester melting at 35-110° C. No. 2,179,313. Elton R. Allison, Kenvil, N. J., to Hercules Powder Co., Wilmington, Del.

Smokeless powder grains, being coated with coumarin. No. 2,179,314. Elton R. Allison, Kenvil, N. J., to Hercules Powder Co., Wilmington, Del.

Smokeless powder surface, being coated with a pine-wood resin insoluble in petroleum hydrocarbons, and characterized by being progressive-burning. No. 2,179,315. Elton R. Allison, Wharton, N. J., to Hercules Powder Co., Wilmington, Del.

Nitration product of a mixture of *a*-methyl glycerol and a carbohydrate. No. 2,179,323. Willard de C. Crater, Newark, Del., to Hercules Powder Co., Wilmington, Del.

Manufacture a double-base smokeless powder with a resinous organic material which is itself non-volatile and non-explosive. No. 2,179,330. Ellsworth S. Goodyear, Kenvil, N. J., to Hercules Powder Co., Wilmington, Del.

As explosive raw material, incompletely charred cotton treated with nitric acid. No. 2,179,434. Joseph Simon, one-half to Daniel Hewitt, both of Chicago, Ill.

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Picryl fluoride, and its preparation as an explosive. No. 2,179,605. Laurence G. Wesson, Boston, Mass., to Veader Leonard, Baltimore, Md.

Reaction of cyanogen halides with an azide or hydrazoic acid, to produce tetrazylazide. No. 2,179,783. Walter Friederich and Karl Flick, Troisdorf, Bez, Cologne, Germany, to Dynamit-Actien-Gesellschaft, vormals Alfred Nobel & Co., Troisdorf, near Cologne, Germany.

Fine Chemicals

Preparation secondary and tertiary furfurylamines by hydrogenating a reaction product of furfural and an amine containing the group $(R)(R')$-NH, where at least one of the (R) groups is hydrocarbon. No. 2,175,585. Homer Adkins, Madison, Wis., and Charles F. Winans, Akron, Ohio.

Distillation of glycolonitrile from aqueous medium at a pH less than 7. No. 2,175,805. Ralph A. Jacobson, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture unsaturated derivatives of isobutyronitrile. No. 2,175,810. Donald J. Loder, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production a ketene, comprising thermal decomposition in the vapor phase, of a lower alkyl ester of a lower aliphatic monobasic acid at 500-1000° C. No. 2,175,811. Donald J. Loder, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture poly-ene carboxylic acids. No. 2,175,843. Richard Kuhn and Christoph Grundmann, Heidelberg, Germany, to Winthrop Chemical Co., Inc., New York City.

Composite joint member, comprising a metallic member, a glass bonded to said metal member, and a ceramic material fusion-welded to said glass member; the last being a material containing 12 parts Na_2O and K_2O, 32 parts lead oxide, and about 1 of Al_2O_3; said ceramic member being a mixture of about 65-80 parts MgO, 35-20 of beryllium oxide, and about 0.5-2 parts TiO_2. No. 2,175,916. Hans Pulfrich, Berlin-Friedenau, Germany, to General Electric Co., a corp. of New York.

Preparation of 3,7-diamino-9-alkyl-10-alkyl-phenanthridinium halides. No. 2,176,889. Walter G. Christiansen, Glen Ridge, N. J., and William Braker, Brooklyn, N. Y., to E. R. Squibb & Sons, New York City.

Manufacture quaternary ammonium derivatives of complex aromatic amides. No. 2,176,896. Albert K. Epstein and Morris Katzman.

Process making aromatic mercury salts, comprising linking an aromatic mercury group with an organic acid radical. No. 2,177,049. Carl N. Andersen, Wellesley Hills, Mass., to Lever Brothers Co., a corp. of Maine.

Preparation of epi-cholesterol, comprising the intermediate step of oxidizing a cholesteryl halide to 7-keto-cholesteryl halide. No. 2,177,355. Russell Earl Marker, State College, Pa., to Parke, Davis & Co., Detroit, Mich.

Preparation a photographic dyestuff from a thio-oxazoledione. No. 2,177,401. Leslie G. S. Brooker, to Eastman Kodak Co., both of Rochester, N. Y.

Preparation a photographic dye from a thiazolone, being a merocyanine dyestuff. No. 2,177,402. Leslie G. S. Brooker, to Eastman Kodak Co., both of Rochester, N. Y.

Preparation an adsorptive carbon, comprising submerging vegetable-derived carbon in water containing enough acetic acid to neutralize the alkalinity, removing the wash liquid, and washing with 50 times its weight of tap water (pH 5-6, with added acetic acid) over a 6-hr. period. No. 2,177,473. Gilbert W. Brant, Buffalo, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process for Grignard preparation of nuclear-substituted derivatives of the morphine series. No. 2,178,010. Lyndon Frederick Small, Charlottesville, Va., and Howard Montgomery Fitch, Woodstown, N. J., to the Government of the United States of America as represented by the Sec. of the Treasury.

Production organic mercury compounds, comprising reacting a soluble mercuric salt and an unsaturated hydrocarbon containing an ethylene linkage, with halogenated aldehydic keto-derivatives. No. 2,178,099. Karl Gornitz, Teltow, and Willy Harnack and Otto Wurm, Berlin-Friedrichshagen, Germany, to Schering Aktiengesellschaft, a corp. of Germany.

Preparation a stable, alkali metal bismuth saccharate solution. No. 2,178,126. Clarence W. Sondern and George Osmore Doak, Kansas City, Mo., to George A. Breon & Co., Inc., Kansas City, Mo.

Preparation sulfo-carboxylic acid esters of alcohol amine derivatives. No. 2,178,139. Albert K. Epstein and Morris Katzman, to The Emulsol Corp., all of Chicago, Ill.

Reaction product of a fatty acid ester of a polymerized tertiary alkylolamine, the fatty radical having at least 6 carbon atoms, with an acid-reacting compound, acyl or alkyl, derivative of a polyhydroxy substance combined with an acid-oxygen compound of oxygen, sulfur, or boron. No. 2,178,173. Morris B. Katzman and Albert K. Epstein, to The Emulsol Corp., both of Chicago, Ill.

Preparation of a series of lower alkyl guaiacols. No. 2,178,603. Roland R. Read, Kirkwood, Mo., to Sharp & Dohme, Inc., Philadelphia, Pa.

Preparation a heavy metal derivative of a cyclic organic nitroso compound. No. 2,178,809. Edgar F. Rosenblatt, East Orange, N. J., to Baker & Co., Inc., Newark, N. J.

Method preparing amino-ketones. No. 2,179,215. Ralph A. Jacobson, to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

Photographic silver halide emulsion containing a dye component fast to diffusion, said component being a polypeptide of a color former. No. 2,179,244. Wilhelm Schneider and Alfred Frohlich, Dessau (Anhalt) Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Process concentrating vitamin D values by adsorption of the vitamin upon activated tricalcium phosphate, through which the vitamin D-containing solution is passed. No. 2,179,560. Sidney E. Miller, Minneapolis, to General Mills, Inc., a corp. of Delaware.

Preparation of hexamethylene tetramine salts of aromatic acids, by combination of metheneamine with an aromatic acid. No. 2,179,618. Monroe D. Edelman, New York, and Edmond T. Tisza, Yonkers, N. Y., to Pyridium Corp., Nepara Park, New York City.

Production of tertiary-unsaturated organic chlorides and chlorhydrin esters, comprising essentially the use of a tertiary alkyl hypochlorite as the chlorinating agent. No. 2,179,787. Charles G. Harford, Quincy, Mass., to Arthur D. Little, Inc., Cambridge, Mass.

Condensation products from the interaction of 1-methyl-cyclopentene-(1)-one-(5) with a system having 2 reactive conjugated double bonds. No. 2,179,809. Wilhelm Bockemuller, Wurzburg, Germany, to Winthrop Chemical Co. Inc., New York City.

Production alkaline earth metals by reduction of their oxides with aluminum. No. 2,179,823. Frank R. Kemmer, Larchmont, N. Y.

Method producing liquid hydrocarbons by thermal dehydrogenation in a heated tube of a normally gaseous hydrocarbon whereupon polymerization is induced in another part of said retort, with the production of higher, normally liquid, hydrocarbon homologs. No. 2,179,829. Mathias Pier, Heidelberg, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method for molecular distillation of high-boiling fatty acids and glycerin. No. 2,179,833. Karl Sondermann, Frankfort-on-the-Main, Germany, to American Lurgi Corp., New York City.

A fused, hard facing alloy of molybdenum, containing 4% boron, 6% chromium, and 3% carbon. No. 2,179,836. Allen E. Wisler and Henry B. Woods, Houston, Texas, to Hughes Tool Co., Houston, Texas.

Manufacture dyestuffs of the methine series yielding clear shades on acetate silk. No. 2,179,895. Werner Muller, Cologne-on-the-Rhine, and Carl Berres, Leverkusen-Wiesdorf, Germany, to General Aniline Works, Inc., New York City.

Preparation perylene-quinone compounds. No. 2,179,920. Erich Clar, Herrnskretschen-on-the-Elbe, Czechoslovakia, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation *l*-ascorbic acid. No. 2,179,976. Curran S. Easley, La Grange, Ga., to The American Mono Rail Co., Cleveland, Ohio.

Preparation of *a*-naphthacetyl-amino acids. No. 2,179,979. Otto Isler, Basel, Switzerland, to Hoffman-La Roche, Inc., Nutley, N. J.

Preparation of 2-hydro-4-methyl-5-hydroxyethyl-thiazole. No. 2,179,984. Hans Spiegelberg, Basel, Switzerland, to Hoffman-La Roche, Inc., Nutley, N. J.

Preparation of 1-hydroxy-benzothiazole. No. 2,179,987. Edward M. Van Duzee, deceased, late of Midland, Mich., by Clarence H. Macomber, administrator, Midland, Mich., to The Dow Chemical Co., Midland, Mich.

Distillation method separating methanol and acetone from their admixtures, wherein the vapors are contacted with a brine solution, whereby acetone is recovered at the head of the distilling column and methanol and brine at its base. No. 2,179,991. Albert G. Bright and Webster E. Fisher, to Eastman Kodak Co., all of Rochester, N. Y.

Method carefully oxidizing sterol compounds to produce unsaturated, polycyclic hydroxy-acids. No. 2,180,095. Lothar Strassberger, Berlin-Wilmersdorf, and Helmut Jacobi, Berlin-Charlottenburg, Germany, to Schering Corporation, Bloomfield, N. J.

Production a stabilized "neutral" oil from destructively-distilled pine wood, comprising extracting the impurities with ethylene diamine. No. 2,180,001. Louis J. Figg, Jr., Kingsport, Tenn., to Eastman Kodak Co., Rochester, N. Y.

Production metal sulfhydryl compounds from keratin degradation products. No. 2,180,262. Ernst Sturm, Berlin-Lankwitz, and Richard Fleischmann, Berlin, Germany, to Johann A. Wulfing, Berlin, Germany.

Industrial Chemicals

Manufacture aluminum chloride from alumina ore; method comprises chlorination of an alumina-containing coke (produced by carbonizing an alumina-pitch mixture) in a vertical retort. No. 21,265. Reissue. William H. Shiffler and Ward P. Anderson, Berkeley, Calif., to Standard Oil Co. of California, San Francisco, Calif.

Manufacture a water-insoluble copper soap derived from a pine-wood material. No. 2,175,189. Frederick A. Stresen-Reuter and Charles Rimpila, Chicago, Ill., to Frederick A. Stresen-Reuter, Inc., a corp. of Illinois.

Manufacture a crystalline dextrose from impure dextrose-containing solutions, method being essentially one of seeding the batch in a water-jacketed crystallizing kettle, the magma being material from a previously-prepared batch. No. 2,175,369. Roscoe C. Wagner and Paul L. Stern, Clinton, Iowa, to Clinton Co., Clinton, Iowa.

Preparation a cyanide salt bath material, consisting of major amounts of sodium cyanide and chloride, and strontium chloride, together with lesser amounts of sodium carbonate, potassium chloride, and sodium fluoride. No. 2,175,417. Ernest A. Walen, Springfield, Mass., to The Heatbath Corp., West Springfield, Mass.

Manufacture a purified dextrinous product from aqueous starch solution. No. 2,175,486. Philip A. Singer, Peoria, Ill.

Manufacture a water-insoluble soap, an alkaline earth metal derivative of a mixture of unsaturated fatty acids, rosin acids, and a small amount of a sterol. No. 2,175,490. Frederick A. Stresen-Reuter and Charles Rimpila, Chicago, Ill., to Frederick A. Stresen-Reuter, Inc., a corp. of Illinois.

Manufacture alkyl phosphites, comprising mixing a saturated alkanol with a tertiary amine, adding a liquified, volatile hydrocarbon solvent, and reacting with PCl_3 at not above 50° F. No. 2,175,509. Thomas H. Rogers, Clarence M. Loane and Bernard H. Shoemaker, Hammond, Ind. to Standard Oil Co., Chicago, Ill.

Preparation of 2-ethylcrotonaldehyde, as an intermediate in the synthesis of 2-ethylbutyraldehyde. No. 2,175,556. Henry L. Cox, South Charleston, W. Va., to Carbide & Carbon Chemicals Corp. of New York.

Manufacture of acetylenic carbinols, by pyrolysis of an acetylenic glycol. No. 2,175,581. Thomas H. Vaughn, Niagara Falls, N. Y., to Union Carbide and Carbon Research Laboratories, Inc., a corp. of New York.

Process and apparatus for the continuous gasification of solid fuels. No. 2,175,610. Willy Linder, Essen-Bredency, Germany, to Koppers Co., Pittsburgh, Pa.

Manufacture a detergent composition containing sodium silicate and a sodium compound of the group consisting of water glass, sodium bicarbonate, monosodium phosphate, disodium phosphate, sodium borate (B_2O_3/Na_2O greater than 1/1); the reactants being so proportioned that Na_2O/acidic oxide is between 1 and 2. No. 2,175,781. Walter S. Riggs, Haddon Hts., N. J., and Clarence W. Eurkhart, Lansdowne, Pa., to Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Process concentrating acetic acid by azeotropic distillation with an entraining liquid. No. 2,175,879. Charles Jean Louis Coutor, Premery, France, to Societe Anonyme Etablissements Lambiotte Freres, Premery (Nievre Department), France.

Preparation a non-flocculated form of colloidal graphite dispersed in an organophilic and substantially non-polar water-insoluble organic liquid, said composition containing also a stabilizer strongly adsorbed to the graphite. No. 2,176,879. Floyd E. Bartell, Ann Arbor, Mich., to Acheson Colloids Corps., New York City.

Process purifying gas containing water vapor and hydrogen sulfide or carbon dioxide, comprising contacting said gas with absorbent composed of liquid polyhydric alcohol, aliphatic amine, and water; absorbent is regenerated by heating. No. 2,177,068. Arthur J. L. Hutchinson, Kansas City, Mo., one-half to The Fluor Corp. Ltd., Los Angeles, Calif., and one-half to Lone Star Gas Co., Dallas, Texas.

Method preparing ore briquettes for smelting, comprising adding about 2% sugar material before briquetting and hardening. No. 2,177,228.

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Otto Seidl, Budapest, Hungary, to Hungaria Kunstdunger, Schwefelsaure und Chemische Industrie, Budapest, Hungary.

Production olefin oxides, comprising passing an olefin and an oxygen-containing gas over an active silver catalyst. No. 2,177,361. Ray M. Carter, Glenbrook, Conn., to U. S. Industrial Alcohol Co., New York City.

Manufacture valuable high-boiling hydrocarbons from asphaltic substances by catalytic destructive hydrogenation. No. 2,177,376. Mathias Pier, Heidelberg, Walter Simon, Ludwigshafen-on-the-Rhine, and August Eisenhut, Heidelberg, Germany, to Standard I. G. Co., Linden, N. J.

Production fatty acid esters, comprising reacting a fatty acid glyceride with a monohydric alkalnol at at least 175° C., in the absence of an alcoholysis catalyst. No. 2,177,407. Virgil L. Hansley, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Reduction a metal compound other than that of an alkali metal compound, comprising reacting said product with a solution of the alkali metal addition compound of an organic compound. No. 2,177,412. Norman D. Scott, Sanborn, and Joseph Frederic Walker, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production an epichlorhydrin, comprising contacting a dichlorhydrin with excess basic metal hydroxide in the presence of water, at not over about 60° C., and recovering said epi-chlorhydrin by live steam distillation at at least atmospheric pressure. No. 2,177,419. William Engs and Alasdair W. Fairbairn, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Preparation acid anhydrides by oxidizing an alkanal with oxygen or ozone. No. 2,177,494. Josef Losch, Felix Walter, Heinrich Behringer, and Otto Schlottig, Knapsack, near Cologne-on-the-Rhine, Germany, to Aktiengesellschaft fur Stickstoffdunger, Knapsack, near Cologne-on-the-Rhine, Germany.

Method hydrogenating a hydrocarbon derived by decarboxylation of rosin acid materials. No. 2,177,530. Edwin R. Littmann, to Hercules Powder Co., both of Wilmington, Del.

Process converting woody materials into useful organic chemicals, comprising heating with added water and lime in an autoclave to 220-360° C. with steam, and recovering from the reaction mix oily materials, alcoholic constituents, and a lime residue containing recoverable organic acidic materials, and destructively distilling the last to obtain lime (for return to the process) and ketonic organicals. No. 2,177,557. Hilding Olof Vidar Bergstrom, Stocksund, near Stockholm, and Karl Nicolaus Cederquist, Stockholm, Sweden.

Production of nitriles, comprising vapor-phase action of a higher fatty acid and volatilizable esters of the acid on ammonia, over a dehydrating catalyst at 320-420° C. No. 2,177,619. Otto Nicodemus, Frankfort-on-the-Main, and Otto Wulff, Koenigstein in Taunus, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Production calcium carbide, comprising fusing lime and carbon in an electric furnace, comprising a two-step carbonization of the lime, forming first a fused product of 60-70% carbide content and then treating further this product with additional carbon, in another part of the crucible, until a product of at least 85% carbide is obtained. No. 2,177,621. Ernst Winter, Cologne-Braunsfeld, Franz Luckerath, Hermulheim, near Cologne, and Paul Windelband, deceased, late of Knapsack, near Cologne, Germany, by Hedi Windelband, administratrix, to Aktiengesellschaft fur Stickstoffdunger, Knapsack, near Cologne-on-the-Rhine, Germany.

Apparatus for electrolytic manufacture of persulfates and other persalts. No. 2,177,626. Josef Muller, Weissenstein-on-the-Drava, Germany, to Oesterreichische Chemische Werke Gesellschaft m.b.H., Vienna, Germany.

Preparation a reaction product of pyrophosphoric acid; comprising a pyrophosphate of an aliphatic polyhydroxy substance having at least 1 free hydroxy group and wherein the hydrogen of at least 1 other hydroxy is replaced by an acyl radical. No. 2,177,650. Benjamin R. Harris, Chicago, Ill.

Process distilling organic liquids with avoidance of decomposition, comprising atomizing the liquid with not less than 5 times its volume of inert gas to form a mist consisting of a continuous phase of inert gas surrounding a discontinuous phase of said liquid and passing this mixture through a suitably heated continuous tubular structure to effect distillation. No. 2,177,664. Alan Porter Lee, New York City.

Cyclic process for sulfur, comprising absorbing SO_2 in an alkali carbonate solution whereby CO_2 and an acid sulfite solution are formed, neutralizing said acid sulfite with alkali carbonate to form CO_2 and a neutral sulfite liquor which is evaporated; the recovered solid sulfite is reduced with carbon, and the sulfide produced, absorbed in water, is decomposed with the waste CO_2 to yield H_2S; the last, together with SO_2, reacts to yield elemental sulfur; alkali carbonate is returned to the process. No. 2,177,707. Gant Gaither, Hopkinsville, Ky.

Manufacture tertiary nitroalcohol esters of phosphoric acid. No. 2,177,757. Byron M. Vanderbilt, to Commercial Solvents Corp., both of Terre Haute, Ind.

Production phosphate esters of polyhydroxy aliphatic ethers and esters. No. 2,177,984. Benjamin R. Harris, Chicago, Ill.

Production lipophile esters of phosphoric acids, comprising treating a lipophilic material having at least 6 carbon atoms with P_2O_5 at not less than about 115° C., and then, after separation of the partially "conditioned" material, subjecting same at an elevated temperature to complete reaction with P O. No. 2,177,983. Benjamin R. Harris, Chicago, Ill.

Separation of ammonium sulfate from liquors containing same, comprising adding to the solution the oxalate of trivalent iron, aluminum, or chromium, and separating the ammonium sulfate by crystallizing out. No. 2,178,082. John Wilfred Richard Rayner, Norton-on-Tees, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Method hastening the calcination of a wet calcium carbonate sludge, comprising adding to the wet sludge about 10% lime to bulk and preheat the sludge entering the kiln. No. 2,178,586. Herman L. Joachim, San Francisco, Calif.

Process decolorizing sugar solutions, comprising treating a sugar solution at elevated temperature with a hypochlorite and a precipitant, agitating, and then adding about 5 times the H_2O_2 required to dechlorinate the solution, whereby color return is prevented. No. 2,178,587. Hans O. Kauffmann, Buffalo, N. Y., to Buffalo Electro-Chemical Co. Inc., Buffalo, N. Y.

Production a stabilized food product from papaya fruit. No. 2,178,593. Leroy Leon Matoush, to Papaya Corp. of America, both of New York City.

Process making tetrachlorethylene, comprising contact surface reaction of vapor phase hexachlorethane and a gaseous, unsaturated aliphatic hydrocarbon having 2 carbon atoms, at 200-400° C. No. 2,178,622. Georg Basel and Erich Schaeffer, Burghausen, Upper Bavaria, Germany, to Dr. Alexander Wacker Gesellschaft fur Elektrochemische Industrie, G.m.b.H., Munich, Bavaria, Germany.

Manufacture H_2O_2, comprising a cyclic oxidation-reduction of an intermediate in a solvent in which H_2O_2 is insoluble to a major degree, para-hydrazo-toluene being the intermediate. No. 2,178,640. John C. Michalek and Edward C. Soule, Niagara Falls, N. Y., to The Mathieson Alkali Works, Inc., New York City.

Process preserving vegetables during transit or storage, comprising cooling vegetables with sulfur-dioxide containing ice. No. 2,178,675. James A. Thomas, Berkeley, Calif., to Esotoo Fumigation Co. Ltd., San Francisco, Calif.

Purification of caustic soda, comprising concentrating the crude caustic liquor substantially saturated with NaCl such that the chloride monohydrate will crystallize therefrom, cooling the liquor to crystallize a substantial amount of both relatively coarse hydrated NaOH and relatively fine NaCl, and effecting a substantial separation of this last mixture by passing the same through a filter of such porosity that substantial amounts of NaCl pass through, but the caustic crystals do not. No. 2,178,694. Irving E. Muskat, Akron, and William F. Waldeck, Wadsworth, Ohio, to The Pittsburgh Plate Glass Co., Allegheny County, Pa.

Bleaching of fibrous materials, comprising the use of a hypochlorous acid solution made by treating purified water with chlorine monoxide. No. 2,178,696. Irving E. Muskat, Akron, and George H. Cady, Wadsworth, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Preparation of hydrohalides of vinylacetylene: the latter is distributed in finely-divided form in an aqueous solution of the hydrogen halide, allowing the addition product to rise to the surface as a liquid layer. No. 2,178,737. Wallace H. Carothers, deceased, late of Wilmington, Del., by Wilmington Trust Co., Wilmington, Del., executor, and Arnold M. Collins, Wilmington, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation mixed anhydrides, comprising reacting ketene with an organic carboxylic acid other than acetic. No. 2,178,752. Anthony H. Gleason, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Delaware.

Preparation a ketostearin from hydrogenated castor oil, comprising heating the latter with a nickel metal catalyst in finely-divided form. No. 2,178,760. Wilbur Arthur Lazier, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Dehydrogenation a higher fatty alcohol, comprising heating with a dehydrogenating metal mixed with chromium sesqui-oxide at elevated pressure and temperature, with evolution of hydrogen and the higher fatty aldehyde. No. 2,178,761. Wilbur A. Lazier, New Castle County, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture a crude, granular silicon carbide by passing a mixture of sand and carbon through a tubular retort such that the product does not adhere to the furnace walls. No. 2,178,773. Raymond C. Benner, Romie L. Melton and John A. Boyer, Niagara Falls, N. Y., to The Carborundum Co., Niagara Falls, N. Y.

Process separating inorganic salts from crude alkyl sulfates containing same and water, comprising adding a water-soluble volatile organic liquid forming a constant-boiling mixture with water and vaporizable at a temperature below the decom. point of the alkyl sulfates, and evaporating to reduce the water content of the batch and to cause the inorganic matter to precipitate out. No. 2,178,786. Egi V. Fasce and Emile C. Rolfs, Jr., Baton Rouge, La., to Standard Oil Development Co., a corp. of Delaware.

Manufacture leavened bread, wherein the leavening agent is essentially hydrogen peroxide. No. 2,178,959. Jacob Freilich, New York, and Charles N. Frey, Scarsdale, N. Y., to Standard Brands Inc., New York City.

Method releasing CO_2 from solution, comprising a bicarbonate solution having suspended therein sharp-edged particles, nuclei for the ebullition of gas when the solution is heated. No. 2,178,968. Ralph H. McKee, New York, and James W. Martin, Yonkers, N. Y., to Maomar Corp., New York City.

Production magnesium hydroxide, comprising slaking calcined raw material containing a substantial proportion of lime with aqueous alkali or alkaline earth nitrate, alkali metal chlorates, and calcium chloride, and also a small amount of boric acid or alkali borate. No. 2,178,983. Fritz Wienert, Bitterfeld, Germany, to Magnesium Development Corp., a corp. of Delaware.

Two-step continuous process for soap manufacture. No. 2,178,987. Benjamin Clayton, Houston, Texas, to Refining, Inc., Reno, Nev.

Process for continuous recovery of glycerine in soap manufacture. No. 2,179,001. Benjamin H. Thurman, Bronxville, N. Y., to Refining, Inc., Reno, Nev.

Method removing water from aqueous allyalcohol, comprising distilling with methylene chloride which forms a constant boiling mixture with the water. No. 2,179,059. Harold R. Slagh, to The Dow Chemical Co., both of Midland, Mich.

Manufacture of ethers, comprising reacting an olefin with aqueous zinc chloride or with aqueous mineral acid containing zinc chloride, at 130-300° C. and 200-400 atmospheres pressure. No. 2,179,092. Vladimir Ipatieff, to Universal Oil Products Co., both of Chicago, Ill.

Manufacture a cocoa compound containing high-purity dextrose. No. 2,179,130. Herbert T. Middleton, Englewood, N. J., to Corn Products Refining Co., New York City.

Preparation sulfonic acids, comprising treating mineral oil fractions with a sulfonating agent while in liquid SO_2 solution. No. 2,179,174. Robert L. Brandt, New York City, to Colgate-Palmolive-Peet Co., Jersey City, N. J.

Process recovering ammonium chloride from coke oven gas liquor. No. 2,179,183. Charles H. Heimbach, Elyria, and Norman B. Thompson, Lorain, Ohio, to National Tube Co., a corp. of New Jersey.

Manufacture an improved asphalt composition, comprising a two-stage blowing and heating treatment. No. 2,179,208. Robert E. Burk and Charles H. Whitacre, Cleveland, Ohio, to Standard Oil Co., Cleveland, Ohio.

Production 1,1,1-trichloropropane, comprising reacting HCL and 1,1-dichloropropene-1. No. 2,179,218. Arthur A. Levine and Oliver W. Cass, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Improved method making ketones from secondary alcohols, comprising passing the vapors of said alcohols over copper coated with zinc oxide, at 650-750° F. No. 2,179,488. Clayton M. Beamer, Elizabeth, N. J., to Standard Alcohol Co.

Production a hydrated tetrasilicate, in which the oxide ratio (Na_2O/SiO_2) is about ¼; said product being a heptahydrate. No. 2,179,806. Walter F. Wegst, Philadelphia, and John H. Wills, Brookhaven, Chester, Pa., to Philadelphia Quartz Co., Philadelphia, Pa.

Production ammonium thiocyanate by heating a suspension of ammonium dithiocarbamate in a neutral, non-polar organic solvent, with evolution of

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H_2S and formation of the desired thiocyanate. No. 2,179,943. Roger A. Mathes, Akron, Ohio, to The B. F. Goodrich Co., New York City.

Manufacture an industrial ethyl alcohol containing 0.5-5.0 parts ethylene diamine per 100 parts ethanol (95%). No. 2,179,997. Louis J. Figg, Jr., Kingsport, Tenn., to Eastman Kodak Co., Rochester, N. Y.

Manufacture an industrial ethyl alcohol containing 0.5-5.0 parts quinoline per 100 parts ethanol (95%). No. 2,179,998. Louis J. Figg, Jr., Kingsport, Tenn., to Eastman Kodak Co., Rochester, N. Y.

Preparation an industrial alcohol containing 0.5-5.0 parts tetrahydrofurfuryl alcohol per 100 parts of 95% ethanol. No. 2,179,999. Louis J. Figg, Jr., Kingsport, Tenn., to Eastman Kodak Co., Rochester, N. Y.

Manufacture industrial alcohol containing 0.5-5.0 parts of a lower alkyl acetal (acetal itself, or dimethyl acetal) per 100 parts of 95% ethanol. No. 2,180,000. Louis J. Figg, Jr., and James Wendell Rhea, Kingsport, Tenn., to Eastman Kodak Co., Rochester, N. Y.

Process for refining and fractioning an impure mixture of lower alkyl amines, said mixture containing primary and secondary amines, alcohol, water, and ammonia. No. 2,180,006. Rudolph Leonard Hasche and Lee G. Davy, Kingsport, Tenn., to Eastman Kodak Co., Rochester, N. Y.

Apparatus for generating acetylene from calcium carbide and water. No. 2,180,085. Hermann Holler and Otto Mues, Frankfort-on-the-Main, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Apparatus separating ethylene from a gaseous mixture, including a separating rectifier, compressor, and throttling device for producing liquid ethylene reflux in the rectifier. No. 2,180,200. William Lane De Baufre, Lincoln, Nebr.

Manufacture of melamine by heating dicyandiamide in the presence of mono-or diethanolamine. No. 2,180,295. David W. Jayne, Jr., Old Greenwich, Conn., to American Cyanamid Co., New York City.

Preparation of pure dibenzanthrones by agitating their crudes with a sulfuric solution sufficiently concentrated to permit of their being easily recrystallized from said solutions. No. 2,180,299. Melvin A. Perkins, Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production sulfonic acid derivatives of polyaryl paraffin hydrocarbons having 8-20 carbon atoms. No. 2,180,314. Charles A. Thomas, Dayton, Ohio, to The Sharples Solvents Corp., Philadelphia, Pa.

Leather

Production tanned hides by treatment with a complex iron compound dissolved in the tanning bath. No. 2,178,102. Werner Huehn, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation a tanning material, comprising treating a hexavalent chromium compound with an oxidation-resistant acid capable of releasing free chromic acid and keeping trivalent chromium in solution, and then treating the resulting product with an unsaturated organic compound to produce a compound containing a trivalent chromium salt. No. 2,178,874. Laurence R. B. Hervey, Lexington, Mass., to Arthur D. Little, Inc., Cambridge, Mass.

Process for making tanning agents, comprising treating a formaldehyde condensate with a sulfonated phenol or naphthol, with a further treatment with a formaldehyde substance and a phenol or naphthol, and causing an action of urea and a formaldehyde substance to take place at a suitable stage in the process. No. 2,179,038. Friedrich Wilhelm Guthke, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture condensation products having a tanning action, comprising combining a dihydroxy-diphenyl-sulfone with glycollic acid, in the presence of a sulfonating agent. No. 2,179,800. Hermann Schuette, Mannheim, Germany, to I. G. Farbenindustrie, Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process treating hides with an alkaline oxidizing agent (e.g., nitrate, nitrite, percarbonate, peroxide), an oxygenated sulfur compound as reducing agent, and a bating step with a mold tryptase. No. 2,179,899. Otto Rohm, Darmstadt, Germany.

Metals, Alloys, Ores

Method reducing finely divided iron oxide to produce particles of finely divided iron metal containing carbon. No. 2,175,850. Raymond L. Patterson and Claus Guenter Goetzel, to Hardy Metallurgical Co., both of New York City.

Process for electro-smelting of beryllium ores, with production of beryllium metal alloys. No. 2,176,906. Bengt R. F. Kjellgren and Charles B. Sawyer, Cleveland Heights, Ohio, to The Brush Beryllium Co., Cleveland, Ohio.

High-strength, conductive alloy of copper, containing 0.05-0.95% cadmium, 0.05-0.95% cobalt. No. 2,177,745. William B. Price, Waterbury, Conn., to P. R. Mallory & Co., Inc., Indianapolis, Ind.

Manufacture magnesium-alloys containing varying proportions of silver-aluminum-manganese, copper-lead, copper-lead-tin, copper-lead-zinc, copper-lead-tin-zinc, silver-manganese, silver-zinc, silver-manganese-zinc, silver-aluminum-zinc, silver-aluminum-manganese-zinc. Nos. 2,178,573-2,178,582. John A. Gann, to The Dow Chemical Co., both of Midland, Mich.

Purification of zinc-containing cadmium sponge, comprising adding the freshly-precipitated sponge to a molten caustic soda containing borax and a salt of the class including alkali and alkaline earth chlorides and fluorides, heating to 350-450° C. to melt the cadmium, and then raising the temperature to about 550° C. to complete the separation of melt and spent caustic. No. 2,178,763. William J. O'Brien, Gates Mills, Ohio, to The Glidden Co., Cleveland, Ohio.

Method removing the red color of heat-treated silicon steel without marked scale removal, comprising pickling with a dilute sulfurous acid at not over 140° F. No. 2,178,791. Donald Cleve Hilty, Apollo, Pa.

Apparatus producing mixtures of N_2 and H_2 suitable for bright-annealing of metals. No. 2,178,833. Hendrik de Wet Erasmus, Lewiston, N. Y., to Union Carbide and Carbon Res. Laboratories, Inc., of New York.

Aqueous quenching medium, comprising an alkali or ammonium pectate and a suitable surface-tension depressant. No. 2,178,925. Clarence Walter Wilson, Norco, Calif., to California Fruit Growers Exchange, Los Angeles, Calif.

Copper alloy, containing 0.1-0.8% silicon, 0.5-3.0% silicon, and 0.05-2.5% silver. No. 2,178,992. Franz R. Hensel and Earl I. Larsen, to P. R. Mallory & Co., all of Indianapolis, Ind.

Zinc alloy, containing 0.25-1.75% aluminum and 0.003-0.035% magnesium. No. 2,180,291. William H. Finkeldey, Hastings on Hudson, N. Y., to The Edes Manufacturing Co., Plymouth, Mass.

Zinc alloy, containing 10.0-1.75% aluminum, 0.001-0.035% magnesium, and 0.002-0.25% manganese. No. 2,180,292. William H. Finkeldey, Hastings on Hudson, N. Y., to The Edes Manufacturing Co., Plymouth, Mass.

Paper & Pulp

Manufacture a filled paper, comprising adding to the pulp the material resulting from the interaction of aqueous, insoluble carbon and a solution of a soluble copper salt. No. 2,178,606. Joseph E. Plumstead, Wilmington, Del., to Raffold Process Corp., Andover, Mass.

Bleach process for wood pulp, comprising treating aqueous wood pulp with a chlorine bleach solution, maintaining the pH at about 8.3-10 until the bleach is practically exhausted, when the pH is raised still further. No. 2,178,649. John Schuber, Syracuse, N. Y., to The Solvay Process Co., New York City.

Process converting sulfite pulp residual liquors into a dry, non-combustible ash residue. No. 2,179,456. George H. Tomlinson, Westmount, Quebec, Canada, and Leslie S. Wilcoxson, Ridgewood, N. J., said Wilcoxson assignor of his right to The Babcock & Wilcox Co., Newark, N. J.

Hardened iron alloy, containing carbon (2.25-4.00%), silicon (1.50-3.50%), titanium (0.05-0.60%), phosphorus (0.60-1.25%), manganese (0.30-1.00%). No. 2,179,695. Walter E. Jominy, to General Motors Corp., both of Detroit, Mich.

Petroleum

Production iso-aliphatic hydrocarbons of high anti-knock motor fuel value. No. 2,175,359. Ernest A. Ocon, Yonkers, N. Y.

Conversion heavy hydrocarbon oils into gasoline and an intermediate-boiling furnace oil fraction. No. 2,175,362. Joseph K. Roberts, Flossmoor, and Jay H. Forrester and Roy J. Diwoky, Chicago, to Standard Oil Co., Chicago, Ill.

Process cracking hydrocarbon oils. No. 2,175,397. Lyman C. Huff, to Universal Oil Products Co., both of Chicago, Ill.

Process purifying petroleum oils, comprising separate treatments with aqueous alkalis and then with sulfuric acid solution, and finally extracting with a selective solvent, and sulfonating the extract thereof to obtain aromatic sulfonates. No. 2,175,437. Arthur Lazar and Thomas F. McCormick, Associated, Calif., to Tide Water Associated Oil Co., San Francisco, Calif.

Reflux fractionating process for separating normally gaseous hydrocarbon mixtures. No. 2,175,590. Paul D. Barton, Chester County, Pa., to Sun Oil Co., Philadelphia, Pa.

Cracking process for converting a higher-boiling petroleum oil to one of motor-fuel boiling range. No. 2,175,663. Eugene C. Herthel, Flossmoor, Ill., to Sinclair Refining Co., New York City.

Two-stage, atmospheric-vacuum non-cracking distillation process, and apparatus therefore, producing a petroleum hydrocarbon fractionated distillates. No. 2,175,817. Cecil Ferdinand Slawson, Lockport, Ill., to The Texas Co., New York City.

Method breaking mineral oil emulsion (water-in-oil type), comprising subjecting the emulsion to action of an alkali metal salt of a sulfonated mineral oil and an alkali metal hexametaphosphate. No. 2,175,818. Daniel Stryker, White Plains, N. Y., to The Texas Co., New York City.

Production a liquid hydrocarbon, normally tending to discolor and form gum during storage, containing a small amount of a tetra-alkyl hexahydroxy-spiro-bis-indane. No. 2,176,883. Charles Harold Fisher, Pittsburgh, Pa., to The Pennsylvania Coal Products Co., Petrolia, Pa.

Process making an improved lubricating oil, comprising treating a mineral liquid hydrocarbon with $PSCl_3$, and separating any solid material produced by such treatment. No. 2,176,884. John G. Butz, Philadelphia, and Leonard N. Leum, Lansdowne, Pa., to The Atlantic Refining Co., Philadelphia, Pa.

Method removing sulfur from mineral oil distillates, comprising contacting said distillates with magnesia at a temperature not below 300° F. nor above the vaporizing point of the distillates. No. 2,177,343. Everett C. Hughes, to The Standard Oil Co., both of Cleveland, Ohio.

Conversion normally gaseous hydrocarbons into normally liquid fuel-type hydrocarbons comprising thermally cracking under pressure a hydrocarbon gas high in paraffinic material. No. 2,177,421. William M. Stratford, Mamaroneck, N. Y., to The Texas Company, New York City.

Method lubricating cadmium-silver, cadmium-nickel, and copper-lead alloys with a lubricant oil containing corrosion-inhibiting portion of triphenyl stibine. No. 2,177,561. Elmer William Cook, New York City, to Tide Water Associated Oil Co., Bayonne, N. J.

Process converting butane-propane-ethane and olefin mixtures over phosphoric acid, to produce gasoline-type motor fuel. No. 2,177,579. Roderick Donald Pinkerton, Chicago, Ill., and William Mendius, Munster, Ind., to Sinclair Refining Co., New York City.

Process for selective cracking of relatively low- and high-boiling hydrocarbons, wherein separate streams of oils of different boiling points are each subjected to cracking in separately controlled reaction zones, and the resulting products then mixed and further treated thermally and fractionated. No. 2,177,829. Lyman C. Huff, to Universal Oil Products Co., both of Chicago, Ill.

Process dewaxing lubricating oils, comprising separation in the presence of a solvent mixture including benzene and ethylene glycol monomethyl ether, with and without added nitrobenzene. No. 2,178,078. Edward John Martin, East Chicago, Ind., to Sinclair Refining Co., New York City.

Manufacture diolefins, comprising converting mono-olefins of less than 6 aliphatic carbon atoms under dehydrogenating conditions, with the action of solid catalyst comprising a compound of chromium, or molybdenum, or tungsten. No. 2,178,584. Aristid V. Grosse, to Universal Oil Products Co., both of Chicago, Ill.

Production diolefins through conversion of lower mono-olefins in a dehydrogenating atmosphere with the aid of a catalyst comprising a compound of titanium, or sirconium, or cerium, or hafnium, or thorium. No. 2,178,601. Jacque C. Morrell, to Universal Oil Products Co., both of Chicago, Ill.

Treatment of mono-olefins with a dehydrogenating atmosphere in the presence of a metal compound comprising a derivative of vanadium, or columbium or tantalum. No. 2,178.602. Jacque C. Morrell and Aristid V. Grosse, to Universal Oil Products Co., all of Chicago, Ill.

Stabilization of normally unstable, substantially saturated aliphatic hydrocarbons containing halogen, comprising contacting the former with conc. sulfuric acid such that the hydrocarbons are thereby stabilized without substantial decomposition. No. 2,178,695. Irving E. Muskat, Akron, and Lynn King, Barberton, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

CHEMICAL INDUSTRIES

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U. S. Chemical Patents

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Sodium plumbite ("doctor") solution of higher active solid content, comprising a solution of litharge in an excess of caustic soda solution containing also 0.25-5.00% (litharge content) of a water-soluble polyhydroxy compound. No. 2,178,742. Joseph E. Drapeau, Jr., Hammond, Ind., to The Glidden Co., Cleveland, Ohio.

Processing a petroleum crude to produce an anti-oxidizing hydrocarbon for lubricating oil, of Saybolt about 1000 secs. at 210° F. No. 2,178,769. Peter J. Wiezevich, Elizabeth, N. J., now by judicial change of name to Peter J. Gaylor, to Standard Oil Development Co., a corp. of Delaware.

Process for isobutylene polymers, comprising essentially the selective depolymerization of a mixture of butylene trimers. No. 2,178,808. Raphael Rosen, Elizabeth, and Robert M. Thomas, Union, N. J., to Standard Oil Development Co., a corp. of Delaware.

Pigments

Luminescent pigment material, comprising 20 parts calcium molybdate, 5 parts lead molybdate, ¼ part lithium oxide, and 75 parts tricalcium orthophosphate. No. 2,170,134. Marcel Servigne, Paris, France, to Societe pour l'Etude & l'Exploitation des Matieres Luminescentes, Paris, France.

Production blended pigments, comprising hydrating calcium sulfate with aqueous titanium pigment, to form a dihydrate of the sulfate mechanically combined with titanium pigment, by a shearing action in a grinder. No. 2,177,250. Marion L. Hanahan, Wilmington, and Rodolphe A. Gagnon, Christiana, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production a blended calcium sulfate-zinc sulfide pigment, comprising hydrating calcium sulfate in the presence of aqueous zinc sulfide suspension. No. 2,177,251. Marion L. Hanahan, Wilmington, and Rudolphe A. Gagnon, Christiana, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production a light-weight, decolorized, anhydrous calcium sulfate of fine particle size, for use as a plaster ingredient. No. 2,177,254. Winfield Walter Heckert, Arden, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method stabilizing pigment-useful alkaline earth metal compounds, of the group consisting of sulfates and carbonates, against particle size increase, comprising intimately associating said compounds with 0.05-10.0% of water-soluble glycolate. No. 2,177,269. Roy William Sullivan, Cragmere, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method coloring granular material, comprising coating the granules with barium fluosilicate, aqueous dispersion of alkali metal silicate, and coloring agent. No. 2,177,389. Carl E. Hillers, Charlottesville, and Horatio L. Small, Esmont, Va., to Blue Ridge Slate Corp., Charlottesville, Va.

Process for aging calcined gypsum. No. 2,177,668. Frank L. Marsh and Dudley C. Chads, Medicine Lodge, Kans., to National Gypsum Co., Buffalo, N. Y.

Method decolorizing colored titanium tetrachloride, comprising contacting the same with a titanium compound of a lower valence. No. 2,178,685. Frederick Gage, Akron, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Manufacture a composite zinc sulfide pigment material. Nos. 2,176,876-7. Hugh V. Alessandroni, to National Lead Co., both of N. Y. City.

Preparation a luminous, radioactive thorium nitrate-calcium sulfide pigment material. No. 2,178,961. Raymond W. Gear, Plymouth, Ind.

Manufacture green ceramic colors of superior heat resistance from the fusion of beryllium oxide and a chromium-oxygen compound. No. 2,180,056. Gustav Jaeger, Neu-Isenburg, and Heinrich Diehl, Frankfort-on-the-Main, Germany, to Deutsche Gold-und Silber-Scheide-Anstalt vormals Roessler, Frankfort-on-the-Main, Germany.

Resins, Plastics, etc.

Production, clear, light-resistant, and transparent condensates from phenol and a carbonyl compound, comprising reacting a phenol with 1-3 mols of formaldehyde in the presence of an alkali, acidifying with lactic acid, adding a reactive urea-formaldehyde condensation product, and heating to completely harden the mixture. No. 2,175,793. Ludwig Cserny, Wiesbaden, Germany, to The Resinous Products & Chemical Co., Philadelphia, Pa.

Preparation a stable-urea-formaldehyde resin solution. No. 2,175,475. Oskar R. Ludwig, to The Resinous Products & Chemical Co., both of Philadelphia, Pa.

Manufacture a resin, comprising reacting in alkaline medium a mixture of butyraldehyde and a phenol, said medium containing an alkaline-reacting catalyst. No. 2,176,951. William J. Bannister, Terre Haute, Ind., to Resinox Corp., New York City.

Process manufacturing vinyl and ethylidene acetates, comprising reacting acetylene with an aliphatic acid in the presence of a mixture of two materials, one being a reaction catalyst, the other a metal salt-oxidant. No. 2,176,958. Henry Dreyfus, London, England.

Composition comprising nitrocellulose of low viscosity and a fatty-oil-acid phthalic glyceride resins. No. 2,177,418. Carleton Ellis, Montclair, N. J., to Ellis-Foster Co., a corp. of New Jersey.

Manufacture water-soluble condensation products, comprising sulfonating a fusible phenol-containing condensate, such that one sulfonic acid group is introduced to every two aromatic nuclei, and sulfonating in a second step to achieve complete water-solubility. No. 2,177,420. Hermann Noerr and Gustav Mauthe, Leverkusen, I. G. Werke, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture a floor covering from wood flour, comprising mixing wood flour, aqueous gel-forming emulsifying agent and water, and applying said mixture to a flexible base, and drying the treated base to form a hard-surfaced material, capable of taking filler and coloring matter into the porous surface. No. 2,177,634. John J. Bradley, Dr., Dedham, and Arthur R. Cripps, Sharon, Mass., to Bird & Son, Inc., East Walpole, Mass.

Method molding rubber condensation derivatives, comprising forming with heat and pressure in a mold a substantially unoxidized condensation derivative of rubber, obtained by decomposing with water the reaction product of chlorostannic acid and a rubber cement. No. 2,178,537. Herbert A. Endres, Silver Lake, Ohio, to Wingfoot Corp., Wilmington, Del.

Production of a condensate from the interaction of formaldehyde and a sulfonated para-t-octylphenoxyethyl sulfuric acid ester. No. 2,178,829. Herman A. Bruson and Clinton W. MacMullen, to Rohm & Haas, all of Philadelphia, Pa.

Preparation of lauryloxy-ethoxy-ethoxy-ethoxyphenyl sulfonic acid. No. 2,178,830. Herman A. Bruson, to Rohm & Haas Corp., both of Philadelphia, Pa.

Manufacture of aromatic polyalkylene ethers. No. 2,178,831. Herman A. Bruson, to Rohm & Haas Co., both of Philadelphia, Pa.

Production a protein plastic, comprising mixing zein and formaldehyde in water, and shaping the plastic mass so formed. No. 2,178,924. Oswald Sturken, Closter, N. J., to Corn Products Refining Co., New York City.

Vapor-phase polymerization of vinyl chloride with a normally liquid monomer, in contact with an indifferent liquid carrying a polymerization catalyst. No. 2,179,040. Werner Heuer, Hofheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture substantially colorless polyvinyl acetal resins in which the molecular structure is characterized by a high percentage displacement of hydroxyl groups. No. 2,179,051. George O. Morrison and Aubrey F. Price, Shawinigan Falls, Quebec, Canada, to Shawinigan Chemicals Limited, Montreal, Quebec, Canada.

Preparation a condensation product from the action of a phosphorus halide or oxyhalide upon a mixture of a sulfonated phenol and an unsulfonated phenol. No. 2,180,260. Josef Schafer, near Basel, Switzerland, to J. R. Geigy A. G., Basel, Switzerland.

Rubber

Method vulcanizing rubber in the presence of an N,N'-bis(1-thio thiazyl) quinone di-imine. No. 2,175,792. Albert M. Clifford, Stow, Ohio, to Wingfoot Corp., Wilmington, Del.

Manufacture rubber hydrohalides of increased resistance to aging, containing carbon black or Prussian blue. Nos. 2,175,801-2. James B. Holden, Akron, O., to Wingfoot Corp., Wilmington, Del.

Preparation a rubber accelerator for vulcanizing, comprising reacting a thiocarbamyl compound with an organic amine. No. 2,175,809. Joy G. Lichty, Stow, Ohio, to Wingfoot Corporation, Wilmington, Del.

Preparation of carbon sulfoselenide from H_2Se and a compound of the group including the aryl isothiocyanates and aryl thiourea. No. 2,175,816. Winfield Scott, Akron, Ohio, to Wingfoot Corp., Wilmington, Del.

Method preventing oxidation and discoloration of rubber, comprising adding a small amount of a tetramethyl hydroxy spiro-bis-indane, wherein the methyls are attached to the saturated rings, the hydroxy to the aromatic rings. No. 2,176,881. Samuel G. Burroughs, Pittsburgh, Pa., to Pennsylvania Coal Products Co., a corp. of Pa.

Method preventing decomposition and discoloration of rubber, comprising incorporating therein a small amount of an alkyl hydroxy spiro-bis-indane having at least two hydroxy groups and different alkyl radicals. No. 2,176,882. Samuel G. Burroughs, Pittsburgh, Pa., to Pennsylvania Coal Products Co., a corp. of Pennsylvania.

Preparation of tris-(diarylthiocarbamyl-mercaptomethyl) amines, by treating a diaryl dithiocarbamic acid with an ammonium halide and formaldehyde. No. 2,177,547. Paul C. Jones, Akron, Ohio, to The B. F. Goodrich Co., New York City.

Method vulcanizing rubber in the presence of a compound of the type: $(R\text{-}S\text{-}A)_sN$, where R is an organic radical and A an alkylene group. No. 2,177,548. Paul C. Jones, Akron, Ohio, to The B. F. Goodrich Co., New York City.

Method vulcanizing rubber, comprising the step including in the operation a product obtained by the one-stage interaction of an aldehyde, diarylamine, and a phenol. No. 2,178,536. Albert M. Clifford, Stow, Ohio, to Wingfoot Corp., Wilmington, Del.

Method vulcanizing rubber, in the presence of the reaction product of about 1 mol of an aromatic hydroxy compound, 5 mols formaldehyde, and 2 of ammonium acid sulfide. No. 2,178,545. William P. ter Horst, Lakewood, Ohio, to Wingfoot Corp., Wilmington, Del.

Preparation a deodorized rubber structure that has been gas-expanded to a sealed-cell structure. No. 2,179,494. Lester S. Cooper, Bedford, Va., to Rubatex Products, Inc., New York City.

Preparation a homogeneous, stable and non-separating composite of chlorinated rubber and a cellulose ester. No. 2,179,980. Heinrich Michaelis, Jr., Berlin-Waidmannslust, Germany, to Richard M. Ritter, Frankford, Philadelphia, Pa.

Textiles

Process improving the properties of articles formed from fiber-forming synthetic polyamides, comprising treating the articles with a compound of the class consisting of formaldehyde and formaldehyde-releasing substances. No. 2,177,637. Donald D. Coffman, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

A thin, flexible, slippery non-fibrous, transparent sheet having a moistureproofing coating containing a film-forming ingredient, moistureproofing agent (such as wax) and, as a slip agent in a phase separate from the main body of the coating, a solvent-soluble beta-diketone of the formula: Q-CO-CH_2-CO-R, where Q and R are alkyl or alkoxy groups having a metal substituted for an enolic hydrogen; said compound having a solubility in toluene of at least 1%. No. 2,177,645. Robert B. Flint, Wilmington, Del., and James A. Mitchell, Kenmore, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process for fireproofing cellulosic fabrics, comprising first applying a water-soluble fire retardant and a wetting agent, and then coating the fabric by dispersion from a volatile solvent of an approx. 60% chlorinated organic substance and a fire-resistant, water-insoluble mineral solid in finely divided form, including a low-temperature-fusible salt suspended in said chlorinated matter. No. 2,178,625. Edwin C. Clayton and Lawrence L. Heffner, to William E. Hooper & Sons Co., all of Baltimore, Md.

Manufacture viscose yarn, comprising extruding the filament into a bath containing a cation-active tetra-alkylammonium salt. No. 2,179,196. James J. Polak, Arnhem, and Johannes G. Weeldenburg, Ede, Netherlands, to American Enka Corp., Enka, N. C.

Method for promoting uniform dye impregnation of woolen fabrics, comprising essentially adding to the acid-dye bath a condensation product of naphthalene sulfonic acid and formaldehyde. No. 2,179,371. Colver P. Dyer, Winchester, Mass., to Monsanto Chemical Co., a corp. of Delaware.

Production a silk-like finish to a cellulose fabric, comprising impregnating the fabric with a caustic soda solution of about 20 Tw. at room temperature, and exposing the treated fabric under tension to a dry heat, and then removing the alkali. No. 2,179,505. Harold I. Huey, Lincoln, R. I., to Sayles Finishing Plants, Inc., Saylesville, R. I.

Utilization of rice oil as an assistant in the treatment of textile fibrous materials. No. 2,180,256. Thomas A. Printon, South Orange, N. J., to National Oil Products Co., Harrison, N. J.